THE ILLUMINATING ENGINEER

LIGHT
LAMPS
FITTINGS
AND
ILLUMINATION

THE JOURNAL OF
GOOD LIGHTING

OIL
GAS
ELECTRICITY
ACETYLENE
PETROL-AIR
GAS
ETC.

Official Organ of the Illuminating Engineering Society

FOUNDED IN LONDON 1908

Edited by
J. STEWART DOW

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Special Features:

The Effect of Colour and Distribution on the Suitability of Lighting for Clerical Work—Street Lighting and Accidents—Annual General Meeting of the Illuminating Engineering Society—Luminous Traffic Signals—Domestic Lighting Appliances—The Modern Arc Lamp Carbon—News from Abroad, etc.

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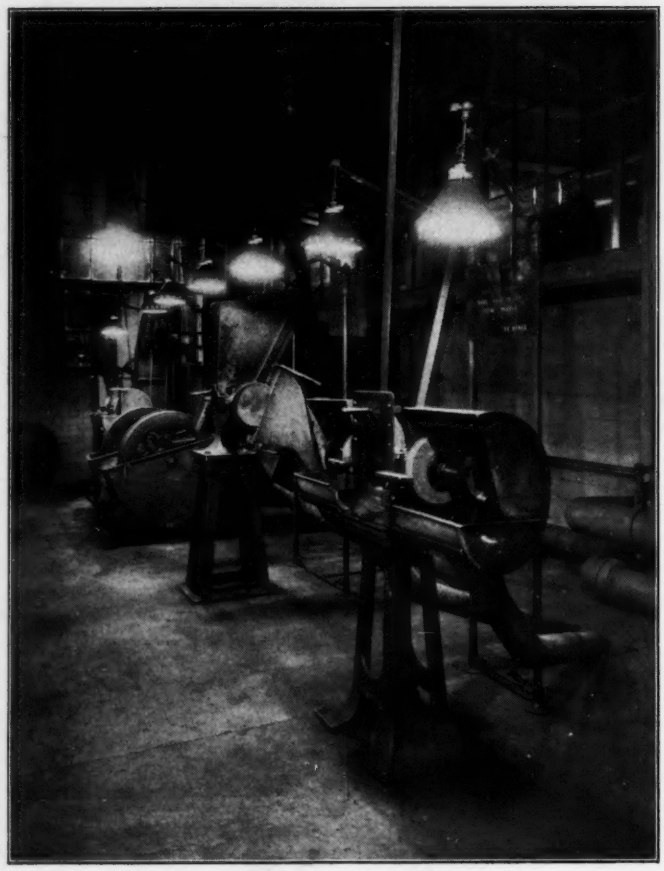
MODERN GAS LIGHTING



Some of a large number of gas-lighted power-driven machines in a London Engineering Shop. Each lighting unit is fixed on a universal swivel arm, which enables the machinist to adjust the position of the light to suit his own comfort and the class of work on which he is engaged. Some of the lamps are used over large grindstones where the fabric of the mantle might be damaged by flying material from the work. The bases of the conical reflectors are therefore closed in with patent wired glass discs, which do not splinter and which prevent any flying pieces from reaching the mantles. Illumination tests recently taken on the working points of the machines give illuminations ranging from 9.7 to 20.8 foot-candles.

GAS

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The G. L. C. C. . . . . is at the service of all concerned with the planning of modern lighting schemes in shops, streets, houses, offices, factories and public buildings. A letter to the address below will receive prompt and careful attention.

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The Effect of Distribution and Colour on the Suitability of Lighting for Clerical Work*

A HIGHLY interesting report on the above subject has been recently issued by the Illumination Research Committee. There is scarcely any matter on which so much difference of opinion exists. Some affirm that the imitation of the colour of daylight results in a light that is more restful and less fatiguing to the eyes. Others apparently find that corrected and uncorrected artificial light answers equally well, provided that the light is hygienically and judiciously applied. Doubtless the personal element, and in particular the condition of the observer's eyes, plays an important part in such decisions. Comparisons between artificial light and daylight are further complicated by differences in the manner in which the light is distributed; rays of light from a very extensive luminous area usually entering from one side (the window) during the day, whereas artificial light is usually received from above and from sources of relatively high brightness and small area. An intermediate condition in this respect is attained when indirect or semi-indirect lighting is provided.

The Committee have evidently been influenced by this consideration. Experiments were made at Teddington with four main methods: (A) Artificial-daylight colour distribution as from a window; (B) colour of vacuum tungsten lamps, distribution as from a window; (C) artificial-daylight colour distribution as from a semi-indirect bowl fitting; (D) colour of vacuum tungsten lamps, distribution as from a semi-indirect bowl fitting. These experiments were made by the aid of clerks and material furnished by the Ministry of Labour, Kew. The work involved the sorting and filing of receipt slips on thin rather shiny paper of a light cream colour. Illuminations of 1, 2 and 4 foot-candles were provided, so that the tests also furnished some indication of the effect of intensity.

The first series of tests, extending over a period of six weeks, was devised to obtain expressions of opinion, based on experience, as to the desirability of the various systems.

In the second series of tests, tests of the rate of working with systems (A) to (D) (and with illuminations of 1, 2 and 4 foot-candles) were made.

The third series of tests was similar in scope to the second, the only variation being that the clerks sat with their backs to the artificial-daylight window instead of facing it (some impressions of glare having been recorded in the previous test).

This series of three tests conducted at the National Physical Laboratory was supplemented by full-scale experiments in various Government Offices by H.M. Office of Works. Various methods of lighting with artificial daylight and uncorrected artificial light were used, both in drawing offices and in rooms devoted to ordinary clerical work.

The general order of preference for the four systems of lighting, as indicated in the first three tests, might be tabulated as follows:—

First Series	Second Series	Third Series (i)	Third Series (ii)
A	C	C	A
C	D	A	C
B	B	B	—
D	A	D	—

It will be seen that, on the whole, the series indicates a distinct preference for the artificial-daylight systems. In the case of the initial experiments included under the third (i) the difference in working results was quite marked. The repetition of these tests, devised to eliminate certain shadow conditions (ii) reversed the order of (A) and (C), but the difference in neither instance was great—whereas the rate of work with (B) and (D) had been found to be 15 to 18 per cent. lower. The experiments serve to show the importance of variations in distribution of light, apart from colour. For instance, the mere fact of workers no longer facing the artificial window and thus avoiding glare apparently had the effect of bringing method (A) from fourth to second place. One somewhat unexpected conclusion was that a change in illumination from 1 to 4 foot-candles apparently had little influence on the results.

The full-scale experiments carried out under actual working conditions in various Government offices were undertaken during the two lighting seasons following the above tests. No attempt to obtain records of work were made, the investigation being confined to the collection of opinions. The methods of lighting were, however, more varied, and were applied to diverse forms of work. This investigation seems to have led to a negative result. There was no general consensus of opinion in favour of artificial-daylight systems, and there was no indication, as might have been expected from the results at Teddington, that if artificial-daylight lamps were

* "Illumination Research": Technical Paper No. 10, issued by the Department of Scientific and Industrial Research (H.M. Stationery Office, 6d. net).

used a lower order of illumination would suffice than for uncorrected light. The advantages of artificial daylight in cases where natural light requires to be constantly supplemented by artificial light are, however, emphasized in the report. It is in these circumstances that the correction of light, so that a visual match with daylight is attained, presents the greatest advantages. There must be many offices in the city of London where a mixture of natural and artificial light is almost continuously used during the winter.

Although the report as a whole does not encourage one to form very definite opinions on the relative merits of corrected and uncorrected light from the standpoint of vision, the experiences are instructive, and if the data were carefully scrutinized some useful lessons might be drawn. It is of interest to note that the " artificial daylight " used at Teddington was obtained exclusively from daylight-blue lamps. In the subsequent experiments in offices, although different types of artificial-daylight units were used, no attempt was made to study their spectrum composition. If, as might conceivably be the case, " restfulness " is a matter of ease in focussing the eyes at close quarters, the exact nature of the distribution of light in the spectrum in order to obtain a visual match with daylight might prove to be of importance. This is a matter which may perhaps come within survey of the Artificial Daylight Committee of the B.E.S.A. We should also be grateful if this Committee could suggest a suitable description for partially corrected light, which is not " artificial daylight " in the strict sense of the word.

The Leon Gaster Memorial Fund

FROM the account of the Annual General Meeting of the Illuminating Engineering Society, which appears elsewhere in this issue, readers will observe that the arrangements in connection with the above fund have now been practically completed. It is anticipated that papers presented during the session 1930-31 will be eligible for the award of the Leon Gaster premium, and we hope that this will encourage members and others to come forward with offers of papers in response to the invitation conveyed by the Council.

We have also been requested to give publicity to one point mentioned at the Annual General Meeting —a slight difference in the conditions governing the award of the premium which has been found expedient. In the original appeal issued in connection with the fund it was stated that the premium should be awarded annually for the best contribution submitted by a subscribing member of the Society. According to expert advice, which has since been taken, it appears that the legal position of the Trust would be more secure, and the probability of its income being exempt from tax much greater, if the award were not restricted to members of the Society but could be earned by anyone. It has accordingly been decided to impose no restriction. This decision is in accordance with the principle preferred by the Council on general grounds. We hope that all subscribers will acquiesce in the adoption of this wider principle. The Hon. Secretary of the Society would, however, be pleased to hear from any subscriber who desires to express his views on this point.

It will be observed that the fund has already attained the minimum sum specified in the original appeal, and it is intended that it shall be closed on July 1st, 1930.

Street Lighting and Accidents

A TIMELY paper (see p. 173) was read by Mr. Robert Beveridge at the recent National " Safety First " Congress at Liverpool, pointing out the importance attaching to better public lighting, owing to the changing conditions of traffic in our streets. It is unfortunate that so many measures which assist motor traffic tend to increase the risks of the pedestrian. Certainly arterial roads have become particularly hazardous, and the need for good illumination in this case is urgent. There is much to be said for the contention that the lighting of such routes should be aided by the Road Fund, thus completing the otherwise splendid roadways for which this fund was brought into being.

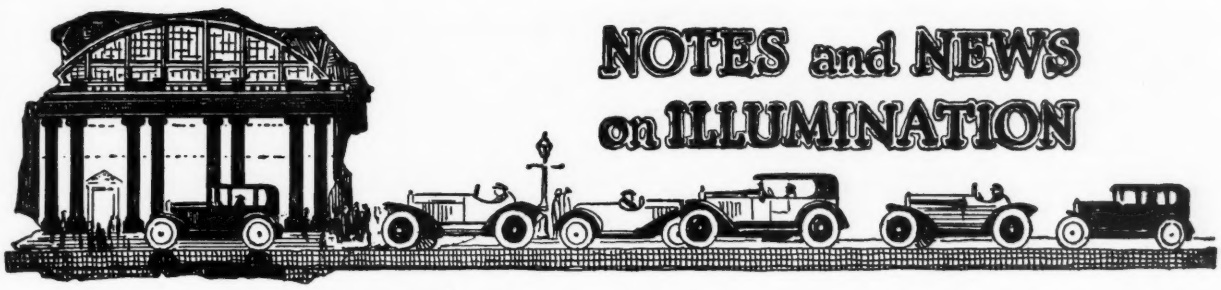
There should also be a clear understanding whose duty it is to light such roads. At present there seems to be some doubt on this point. In the case of several arterial routes in the north of London the number of authorities through which they pass is considerable, with the result that one finds lighted and unlighted sections in juxtaposition.

Reference was also made to the difficult question of motor-car headlights. We understand that there is no specific limit to the brilliancy of such headlights in this country, although in the United States and in many cities abroad there are definite regulations. The fact that accidents ascribed entirely to this cause seem to be comparatively few speaks well for the good sense and judgment of motorists. But there is a general feeling that important thoroughfares within city areas should be sufficiently well lighted to render headlights unnecessary. On arterial roads they may still be needed, but some understanding based on the use of the depressible beam, such as that adopted in France, might well be adopted.

Mr. Beveridge is a strong believer in the utility of luminous traffic signals, which have been installed with success in Edinburgh. The Chief Constable's annual report shows a decided diminution in accidents at points where they have been installed; it is certainly remarkable that in Edinburgh, almost unique amongst cities, the accident curve is on the down grade.

This experience leads one to think that much useful information might be obtained by lighting experts from the detailed records of accidents available in leading cities. The annual report issued by the Home Office is valuable in that it gives us an indication whether accidents as a whole are increasing or diminishing. A close scrutiny of the figures reveals variations in the accident rates of different cities which seem to deserve enquiry. But the records tell us nothing of the proportion of accidents occurring by night, and how these have been affected by changes in lighting conditions and/or by the installation of luminous traffic signals.

Data of the kind mentioned by Mr. Beveridge might prove extremely useful to public lighting engineers, and might also be helpful to others in affording practical evidence of the importance of adequate lighting. We should imagine that information of this kind might be obtained from chief constables in individual cities, who are usually in close touch with public lighting departments. It would be interesting to know, for example, (1) whether night accidents form an undue proportion of the whole; (2) whether the night accidents have been increasing at a less or greater rate than day accidents; (3) how far luminous traffic signals have already been influential in diminishing the number of accidents at certain points. If the Association of Public Lighting Engineers could institute a systematic statistical enquiry amongst its members, it should be able to present an informative report.



The Lighting of Arterial Roads

The recent "Safety First Week" must, one would think, have directed public attention to the important question of the lighting of arterial roads—a matter also commented upon by Mr. Beveridge in his paper at Liverpool. These wide thoroughfares, as Mr. Beveridge remarked, offer special danger to pedestrians, which is not lessened by the disposition of some motorists to convert such roads into racing tracks. The problem of the lighting of such routes has been in evidence in the north of London. It is instructive to note that in only 11 miles of the great Cambridge arterial road there are sections under the control of the Tottenham, Edmonton, Enfield, Southgate, Wood Green and Cheshunt Councils. Tottenham District Council recently set a good example to other councils by furnishing gas lighting for the southern region of the Cambridge Road. Edmonton has followed a similar course. Wood Green is expected to follow the example of Edmonton very shortly and Cheshunt is also understood to be considering the lighting of its section. It appears that, at the moment of writing, lighting has not yet been decided upon in the Enfield section. The *Weekly Herald* in mentioning these facts also draws attention to the North Circular Road. Part of this is well lighted but there is a region where lights are found at present on one side of the road only. Other instances of anomalies in the lighting of these national highways will doubtless occur to our readers. It is surely time that either the Ministry of Transport or the county councils, or both, should be empowered to deal with the matter so that there may be "no complaining in our streets."

Photo-Electric Control

The use of the photo-electric cell to control public lighting is an interesting modern development which is now being experimented with. Illuminated signs might be similarly controlled, and one can imagine the system applied to the lighting of offices and factories so that artificial light may be switched on when daylight has fallen to a prescribed value. Equally interesting are applications based upon the interruption of a beam of light, such as the use of the photo-electric cell to count the passage of vehicles—a device which, we believe, is already in operation in the Holland Tunnel in the United States. Obviously this idea could be applied to other counting operations, such as the packing of articles of similar size, or even the sorting of packages according to size, shape or reflecting power. Control-equipment of this kind is now being developed in the United States for many industrial operations. A typical application is the control of a machine which should travel to a certain distance and then reverse. Other examples would be the stopping of a paper machine when the paper breaks, aligning the paper off the rolls of the same machine, deflecting packages on conveyors, or operating bag-piling mechanisms.

Board of Trade Announcement

The Board of Trade announce that in pursuance of the powers conferred upon them by Section 3 of the Merchandise Marks Act (1926) they have made a direction that electric incandescent lamps of ornamental design which, on account of their uneven surface, cannot be marked on the bulb as prescribed by the Merchandise Marks (Imported Goods) No. 2 Order, 1928, may bear an indication of origin indelibly stamped, embossed, incised or impressed on the cap.

Measurements of Atmospheric Pollution

The fourteenth report on the above subject for the year ending March 31st, 1928, has been recently issued by the Department of Scientific and Industrial Research.* Detailed records of smoke deposits are presented. A common feature is the increasing density of such deposits as one approaches the centres of cities. The evidence of the continuation of pollution of the atmosphere is depressing but salutary. Unfortunately progress during recent years does not appear very encouraging. From records obtained in London and Glasgow the curious fact emerges that over the period 1915-1921 there was a material improvement in both cities, yet the position subsequently has remained merely stationary and there was even an appreciable increase in pollution during the year just terminated. Ingenious measurements of daylight, based on the liberation of free iodine from potassium iodine under the action of sunlight, have been carried out by Mr. H. H. Bagnell at Salford. At all stations there is a well marked cyclical variation according to the period of the year, but the amount of sunlight available is invariably less in the most densely populated districts than in outlying areas near the city boundary.

British Standard Specifications

Several useful specifications have been added to the list issued by the British Engineering Standards Association. Amongst these we note No. 379-1930, which deals with Components of Optical Projection Apparatus and which was prepared by a representative committee set up at the request of the Optical Society. The dimensions provide primarily for lanterns with slides $2\frac{1}{4}$ ins. by $3\frac{1}{4}$ ins., although the Continental and American sizes can be used in with an appropriate carrier. Diameters of 4 ins. and $4\frac{1}{2}$ ins. are recognized as standard for condenser lenses. Other specifications are concerned with Electric Motors and Generators for Mines (No. 377-1930) and with Miners' Handlamp Bulbs (No. 377-1930). The latter provides for the ordinary class of 2-volt bulb with a nominal rating of 2-volts used underground in collieries. Investigations, carried out in the lamp factory, laboratories and the mines, were exceptionally comprehensive and possibly unique. This is undoubtedly a field where a standard specification was badly needed. Copies of these specifications may be obtained from the British Engineering Standards Association, Publications Department, 28, Victoria Street, London, S.W.1 (Price 2s. 2d. each, post free.)

Sir Francis Goodenough

We record with pleasure the appearance in the King's Birthday Honours List of the name of Mr. F. W. Goodenough, C.B.E., on whom the distinction of a knighthood is conferred. Sir Francis, as we must now describe him, is best known to our readers as a Vice-President of the Illuminating Engineering Society, as the controller of gas sales to the Gas Light and Coke Company, and as the Chairman of the British Commercial Gas Association. But he has also done valuable work as Chairman of the Government Committee on Education in Salesmanship. We feel sure that his many friends in all sections of the lighting industry will join us in congratulating him on this well-merited honour.

* Published by His Majesty's Stationary Office; 3s. 6d. net.

Recommendations on Lighting in Germany

A revised version of their existing recommendations on lighting has been prepared by a committee of the German Illuminating Engineering Society and is now published in *Licht und Lampe** with a foreword inviting comment. Modifications may be suggested for consideration up to June 30th. We hope in due course to be able to give readers a detailed version of these recommendations in their final form. Meantime it may be noted that the original figures have been modified considerably. There is a substantial advance in the values of illumination recommended for factories. A distinction is drawn between complete general lighting and a combination of general and local lighting. In the former case a value of 100 lux (approximately 10 foot-candles) is recommended for very fine work, and the recommended value is 300 lux (30 foot-candles). In the case of local lighting (*Platzbeleuchtung*) an illumination of 1,000-3,000 lux is contemplated. There are also recommendations for illumination necessary in the interests of traffic (Verkehrsanlagen) in which category streets, wharfs, railway platforms, etc., are included. The method here is to prescribe minimum and recommended values of " average illumination," and special figures also for " least favoured spots "—a procedure which seems to be a judicious way of reconciling the conflict of opinion in regard to the specification of street lighting in terms of average or minimum illumination. Other clauses deal with shadow, uniformity of illumination and glare, the latter being dealt with by prescribing a limit to the proportion of light emitted within certain zones. There are general recommendations on such points as colour, equipment and maintenance. A useful final recommendation is that artificial light should be turned on in offices, factories, etc., half an hour after sunset and half an hour before sunrise during the winter half-year, three-quarters of an hour being substituted during the summer period.

Decorative Lighting

A feature in American and Continental journals during the last two months has been the prominence given to novel forms of decorative lighting. We notice in *Light* an illustrated interview with Dr. Zay Jeffries depicting the novel and even fantastic lighting schemes which figure in German night-life, and a striking picture of the interior of the famous Wertheim store in Berlin, which seems to be literally " modelled in light." Numerous examples of the adoption of luminous ceiling panels, sometimes as a supplement to cornice lighting in American stores (and even churches) are shown. There is also a note on an ingenious mode of constructing signs, three coloured lamps, red, green and blue being enclosed so as to form a unit of colour control. A lighted letter may assume a chequer-board pattern, or there may be a solid bank in which letters are formed of contrasting colours. The lighting of playgrounds, tennis courts, etc., in parks by night seems to be becoming increasingly usual. Herr Hans Koch has in *Die Lichttechnik* an illustrated article featuring novel forms of decorative lighting in Paris, and in *Illuminotecnica* there are views of many imposing buildings floodlighted. Especially pleasing are two examples of church-lighting—the Duomo di Orvieto and the Duomo de Como.

* *Licht und Lampe*, May 15th, May 29th, 1930.

Artificial Light in Horticulture

The raising of small seedlings is a particularly promising field for the use of artificial light in horticulture. In the early stage of growth many seedlings are highly sensitive and are liable to the affection known as " damping off " when sunlight is insufficient. By the aid of artificial light the young plants can be kept growing during unfavourable periods. Apart from the stimulation of the light the heat radiated by overhead lamps is also helpful. Mr. M. Luckiesh, in dealing with some experiments conducted at the Massachusetts Agricultural College, mentions another curious fact. Some plants tend to produce only pistillate flowers during the winter months. But if the seedlings are exposed to artificial light sufficient staminate plants may be produced to ensure self-pollination. An extra generation may thus be secured. By using 200-watt lamps in suitable reflectors at a height of two feet, quite a large number of seedlings can be dealt with and the expense is by no means prohibitive. On the other hand the stimulation of mature plants by artificial light in order to bring them into flower, though very effectual in certain cases, does involve somewhat high consumption of electricity which may not be economically justified.

The S.A.E.L.A. Lighting Service Bureau

It seems but a short time since Mr. E. S. Evans left for South Africa with the good wishes of his friends in England. We have recently been favoured by some particulars of the work of the " Saela " (South African Electric Lamp Association) Bureau, which he is organizing. It is evident that he has lost no time in getting to work. The Bureau was opened by the Mayor of Johannesburg, on February 14th, when there was a representative gathering, a number of industrial leaders in that city being present. In a recent paper read before the South African Institute of Electrical Engineers, Mr. Evans reviewed the work of the Bureau and presented a number of pictures illustrating its equipment. He was congratulated on his paper by the President and Mr. R. F. Botting, who referred to the remarkable progress in methods of lighting that has taken place in England during recent years. We have before us a programme of the first " Saela " illumination design course, which was held during April 3rd to 16th. This comprised a series of ten lectures on similar lines to those incorporated in the E.L.M.A. courses in this country.

Artificial Light Applied to Modern Photography

A useful handbook on the above subject has been issued by the *Associazione Nazionale per lo Sviluppo dell' Illuminazione* in Italy. Typical equipment comprising incandescent electric lamps, diffusing screens, reflectors, etc., is illustrated and described. Some of the appliances seem novel, notably the use of an illuminated artificial flood (incandescent lamps mounted beneath panes of diffusing glass) as a supplement to overhead lighting. The booklet contains numerous examples of portraiture, a good feature being the reproduction of the actual picture and a secondary photograph showing the method of lighting and the subject in position. A section deals with commercial photographs and the photography of objects *in situ*, of which some excellent examples are reproduced.

TECHNICAL SECTION

COMPRISING

Transactions of The Illuminating Engineering Society and Special Articles

The Illuminating Engineering Society is not, as a body, responsible for the opinions expressed by individual authors or speakers.

The Annual General Meeting of the Illuminating Engineering Society

(Held in the Lecture Theatre of the Home Office Industrial Museum, Horseferry Road, Westminster, S.W.1, at 6.30 p.m. on Tuesday, June 3rd, 1930).

THE Annual General Meeting of the Illuminating Engineering Society was held in the Lecture Theatre of the Home Office Industrial Museum (Horseferry Road, Westminster, S.W.1), at 6.30 p.m. on Tuesday, June 3rd, 1930, The PRESIDENT (Dr. John W. T. Walsh) in the chair.

The minutes of the last meeting, which had been circulated, were taken as read and confirmed.

The HON. SECRETARY then presented the names of the following applicants for membership:—

Odam, Major F., ...Electrical Engineer, Alliance Wholesale Ltd., 62, Great Russell Street, London, W.C.1.

Robertson, H.,.....Architect, 36, Bedford Square, London, W.C.1.

The names of applicants presented at the last meeting of the Society* were read again and these gentlemen were formally declared members of the Society.

The PRESIDENT remarked that the custom had grown up in the Society of the President having to say a few words on vacating his office. On this occasion his words would be few. He had taken as his subject "Research in Illumination."

PRESIDENTIAL ADDRESS

Research in Illumination

By J. W. T. WALSH, M.A., D.Sc.

I suppose the time is rapidly passing when the place of research in any branch of industry, and especially in any branch of the great engineering industry, needs any apologia. It is gradually being recognized that, without research, an industry stagnates and by remaining stationary soon falls behind its rivals and companions in the economic race. Similarly, the standard of living must remain stationary and even fall unless mankind prosecutes research in every subject which affects the welfare and comfort of civilized existence.

Among those industries which contribute most directly and most obviously to the health and well-being of the community, the lighting industry must surely rank very high. Modern conditions of life are such that good lighting—using the phrase in its broadest sense—has become vital to the health of mankind, and the standard of living is very markedly dependent on the facilities provided for better lighting conditions, whether in the industrial, the domestic or the recreational sphere of human activity.

While, I suppose, there are few who would question these general statements, it is not without interest to examine the matter in somewhat greater detail and to demonstrate the truth of what has just been said by reference to specific advances and their effect on everyday life. The example which at once occurs to one's mind is the series of researches that have now demonstrated beyond all possible doubt the benefit of really good lighting in places where industrial processes are carried on. Little by little evidence has been accumulated to show that adequate lighting is, in many cases, not to be measured by 1 or 2 foot-candles, but by at least ten times this amount. As far as I am aware, the last step taken in this research was the work in the printing industry carried out jointly by the Medical Research Council and the Department of Scientific and Industrial Research. It may interest members of this Society to know that the conclusions arrived at as the result of this investigation were put into practice by a large printing firm in the Midlands. The requisite illumination was provided in one room as a first step and the results of this trial were such that the same illumination was afterwards installed throughout the works. That is only an isolated example of what is going on all over the country, but it serves to demonstrate the value of such researches to the "man in the street."

We may now turn to a totally different matter, picture gallery lighting. It is well recognized that the reflections in the glass covering the pictures, especially if these are dark in tone, can be most objectionable and not infrequently entirely prevent any proper view of the painting except, perhaps, from some out-of-the-way position which the spectator has to find by a dodging process of trial and error. As a result of researches carried out in fairly recent years, it is now possible to design a gallery in such a way that even the darkest pictures can be seen without any interference due to reflections, in fact they appear as if there were no glass covering them at all. A gallery designed on these principles is now actually in existence at Millbank (Room IX, in the Duveen wing) and it well repays a visit from anyone interested in this particular subject. The fact that a similar design has not been adopted in galleries erected subsequently is due to the emphasis placed on the æsthetic value of the general design of a room as compared with the suitability of the light for the comfortable appreciation of the paintings exhibited in it. There is little doubt in my mind, however, that in the not very distant future all new picture galleries will be designed in such a way that reflections are avoided and the pictures can be seen as the artist intended them to be seen.

These are just two examples mentioned more or less at random, but there are others which could be cited, such as the development of artificial daylight units and their use for colour matching and similar purposes, the study of the effectiveness of light-wells in buildings,

* *The Illuminating Engineer*, June, 1930, p. 141.

and the establishment of a criterion for adequate daylight for ordinary purposes and the use of such a criterion in the settlement of disputes relating to interference with daylight. Even this by no means exhausts the list.

The great value of such researches cannot, I think, be doubted, but we all know that research is expensive, and sometimes the results obtained in a particular direction do not seem to justify the cost. Moreover the benefits are frequently to the community as a whole and only very indirectly to the industry concerned. For instance, in the case of the second example cited above, viz., the correct design of picture galleries, no financial benefit can possibly accrue to any individual or commercial organization. In such cases it is obviously unfair to expect that research will be financed wholly by the industry and it is only logical that the State should bear its share. On the other hand, it is clear that there are many directions in which the results of research are of direct value to an organization and in many such cases the very high cost of research has been rightly borne by the industry. The outstanding example is, of course, the long series of researches responsible for the constantly improving efficiency of our principal sources of light. Without these, many of the other researches would be barren because they necessitate the provision of an abundance of light which would have been quite out of the question not very many years ago.

It is clear, then, that only a close co-operation between industry and the State, and a recognition by both of the supreme value or research in illumination, as in other fields of engineering, can produce the maximum benefit to the community at large. Happily, I believe that this co-operation and this recognition exist to a marked degree in this country. The principal industrial organizations concerned with lighting, the Department of State principally concerned with scientific research, and other bodies such as the British Engineering Standards Association, the National Illumination Committee and last, but by no means least, our own Society, work hand in hand for the betterment of lighting conditions in all the aspects of our daily life. Much of the benefit of research is liable to be lost, or at any rate its realization is delayed, in the absence of machinery for its rapid dissemination and for the publication of discussions of the results obtained. In this part of the work, the Illuminating Engineering Society has borne an honourable part and it will, I hope, continue to do so for many years to come.

I cannot conclude without a reference to the International Illumination Congress planned for September of next year. What our Society does for this country, that Congress and the International Commission on Illumination are striving to do internationally. We in Great Britain may well be proud of the part we have played and are playing in the spread of good lighting. Our members are devoting themselves whole-heartedly to the plans for the Congress, and I have no reason to doubt that in 18 months time we shall have no reason to be ashamed of the part Great Britain played in the World Illumination Congress of 1931.

Report of the Council and Accounts for the Past Session

The HON. SECRETARY, in presenting the report of the Council and the accounts for the past session (see pp. 167-170) said that as they had been circulated amongst the members all he need do was to briefly touch on one or two of the salient points. As would be seen from the report the Society had been very actively engaged. It had applied for incorporation and had presented its memorandum, articles and by-laws. No objection had been raised on questions of principle by the Board of Trade, but there were a number of relatively slight modifications which were desired on legal grounds. These points were now being considered, and it was hoped that by the Autumn the entire document would be presented to the members for their approval.

In addition the committees of the Society had been put on a more permanent basis and a considerable amount of useful work was already being done by the Technical Committee under the chairmanship of Mr. Beuttell.

The draft of the Trust Deed for the Leon Gaster Memorial Fund, which would remain open until July 1st, was nearly complete. It was anticipated that papers presented during the coming session would be eligible for the premium and he hoped that members would respond to the invitation of the Council and send in some interesting contributions. Expert advice had recently been obtained on certain legal aspects. It appeared that, with a view to securing remission of Income Tax and also to avoid complications in connection with the Statute of Perpetuities it was considered desirable that there should be no restriction with regard to the award of premiums, i.e., that they should not be confined to the members of the Society, but could be competed for by anyone who chose. The natural feeling of the Council was in favour of this wide scope, and they did not regret the broader basis imposed upon them. At the same time, as this involved a slight modification of what was originally proposed, he had been asked to mention the matter to the meeting and to arrange that in the next issue of the Journal the position would be clearly stated.

The past session had been a good one and the Society hoped to have a better session next year. There had been a fairly satisfactory advance in membership, but, naturally, there were some who dropped out from time to time, and he would therefore ask members to do their utmost to interest their friends in the Society so that ultimately the number of members would attain a very much larger figure that at present.

The financial position was clearly outlined in the accounts. It would be seen that this year, for the first time, the accounts had been audited by chartered accountants. He would like to take this opportunity of mentioning the efficient work of his staff which had enabled the audit to be concluded in a single morning. Although the Society was progressing, he would like to see the financial position still further improved in view of the calls which they would doubtless be called upon to meet in the future.

As an instance he might mention that the Council had already agreed to make a substantial contribution from the Society's fund to the International Illumination Congress. He felt sure that this decision would have the hearty approval of members, who were one and all anxious to do everything possible to render the Congress a success.

Resolutions

The following resolution was then moved by Mr. G. H. WILSON, seconded by Mr. P. GOOD, and declared carried unanimously:—

> "That the report of the Council for the session 1929-1930, and the accounts of the Illuminating Engineering Society for the period from January 1st, 1929, to December 31st, 1929, be hereby adopted, and that a vote of thanks be extended to the President, Council and Officers for their efforts on behalf of the Society during the past session."

The PRESIDENT then moved, and Col. C. H. SILVESTER EVANS seconded:—

> "That this meeting records its appreciation of the services of Messrs. Robert J. Ward and Company as Honorary Auditors of the Society and requests them to act in this capacity for the next session."

This resolution was likewise put to the meeting and declared carried unanimously.

The President stated that no other nominations having been received, the nominees for officers and council enumerated in the annual report were duly elected. He felt sure that the Society would feel highly honoured by having so distinguished a member as Colonel Edgcumbe as their next President (applause), and he congratulated the Society on the acquisition which it had made.

VOTE OF THANKS TO RETIRING PRESIDENT.

Mr. D. R. WILSON (*Past President*) said that it was his pleasant duty to propose a vote of thanks to the retiring President, Dr. Walsh. As a member of Council he knew what an immense amount of time and work had been devoted by Dr. Walsh to the interests of the Society during his term of office. Dr. Walsh had not only served as President of the Council but on numerous committees; in fact the only occasions on which he met Dr. Walsh was on committees, where he thought he must spend his whole time! (Laughter and applause.) The annual report which members had been examining was, he thought, a very good indication of the progress made during Dr. Walsh's Presidency. He felt sure everyone would desire to thank him for his great services to the Society, at the same time welcoming his successor, feeling confident that the future of the Society was in the best possible hands. He would ask Col. Edgcumbe to second the vote of thanks.

Lt.-Col. K. EDGCUMBE said that he seconded the resolution with the very greatest pleasure, and wished to endorse all that had been said regarding Dr. Walsh's services. He had only one grievance against Dr. Walsh —that he had been such an excellent president that it was exceedingly difficult to follow him. However, he would do his best. (Applause.)

The PRESIDENT, in acknowledging the vote of thanks, said that he was very grateful indeed for the kind remarks that had been made. He had much enjoyed his term of office and that enjoyment had been very largely due to the general enthusiasm and the happy spirit prevailing amongst the members of the Council. He thought that it would be a revelation to the members of many societies to be present at a meeting of the Council of the Illuminating Engineering Society—to observe how everyone there was prepared to work and to work hard for the benefit of the Society. It was that which made the gatherings such happy ones. He would like to take this opportunity of thanking all of them for help which they had rendered.

Report of the Council for the Session October, 1929, to June, 1930

(Presented at the Annual General Meeting of the Illuminating Engineering Society, held in the Lecture Theatre of the Home Office Industrial Museum, at 6.30 p.m., on Tuesday, June 3rd, 1930.)

IN presenting the customary record of the past session the Council is again able to report progress in the work of the Illuminating Engineering Society.

The Council has continued to receive valuable aid from members in their effort to place the Society on a firm foundation.

ELECTION OF OFFICERS AND COUNCIL FOR THE NEXT SESSION.

The procedure approved in regard to the election of officers of the Council at the Special General Meeting, held on July 9th, 1929, has been adopted. A list of all the existing officers and members of the Council and of all nominations made by the Council to fill vacancies has been published in *The Illuminating Engineer*, and has also been circulated to all members, who were afforded an opportunity of making additional nominations if they so desired.

No independent nominations having been received, the gentlemen nominated by the Council are automatically elected. Accordingly, Lt.-Col. K. Edgcumbe, T.D., M.Inst.C.E., M.I.E.E., will become President for the next session; Mr. C. W. Sully will become Vice-President. Mr. J. S. Dow and Mr. J. Wyatt Ife will continue as Hon. Secretary and Hon. Treasurer respectively.

The following members will fill vacancies on the Council: Mr. L. E. Buckell, Mr. H. Buckley, Dr. S. English, Mr. F. W. Purse and Mr. John Terrace.

ARTICLES OF ASSOCIATION AND BY-LAWS.

It will be recalled that a revised version of the Constitution of the Society was approved at a Special General Meeting of the Society, held on July 9th, 1929. A committee of the Society subsequently undertook the task of incorporating this Constitution in Articles and By-laws, suitable for presentation to the Board of Trade with a view to the Society becoming an incorporated body. In conjunction with a representative of Messrs. Radcliffes & Hood, St. Barbe, Sladen and Wing, the committee has prepared a draft of the Memorandum, Articles and By-laws in a suitable printed form. After acceptance by the Council this has been presented to the Board of Trade. It is hoped that their sanction will be obtained in due course, after which the final version of the Articles and By-laws will be presented to members for ratification at a Special General Meeting.

The Council desires to record its appreciation of the services of the members of the committee who have been engaged on this somewhat onerous task.

COMMITTEE OF THE SOCIETY.

With a view to regularizing procedure in dealing with the affairs of the Society, the Council also formed a committee consisting of the President (Dr. John W. T. Walsh), a Past President (Mr. C. C. Paterson), the Hon. Secretary (Mr. J. S. Dow), Lt.-Commander Haydn T. Harrison and Mr. W. J. Jones to review the existing committees of the Society. The committee having reported on this subject to the Council, it was agreed that the various committees of the Society should be constituted as follows:—

Administrative Committees.

(1) A General Purposes Committee, consisting of the President, Honorary Secretary and three other Members of Council.

(2) A Papers Committee, similarly constituted, the three additional members, however, not including any of those serving on the General Purposes Committee.

(3) A Technical Committee, whose main task would be the collection of information illustrating the benefits of good lighting and the presentation to consumers of the main principles of good illumination; and who would deal with any technical problems which the Council might submit to it in the future.

These three committees will be elected annually. The President and Hon. Secretary are ex-officio members of all committees, but do not necessarily preside over committees at which they are present in their official capacity.

In addition there are two *ad hoc* committees, dealing respectively with the Leon Gaster Memorial Fund and the Articles and By-laws and the question of incorporation.

These five committees are at present constituted as follows:—

General Purposes Committee: Mr. J. S. Dow, Mr. J. Eck, Lt.-Col. K. Edgcumbe, Mr. J. Wyatt Ife, Mr. C. C. Paterson, Mr. C. W. Sully, Dr. J. W. T. Walsh, Mr. D. R. Wilson.

Papers Committee: Mr J. G. Clark, Mr. A. Cunnington, Mr. J. S. Dow, Mr. W. J. Jones and Dr. J. W. T. Walsh.

Technical Committee: Mr. A. W. Beuttell (Chairman). Mr. A. Blok, Mr. J. S. Dow, Mr. S. G. Elliot, Dr. S. English, Mr. W. J. Jones, Mr. E. L. Oughton, Mr. Phillip Sugg, and Mr. G. H. Wilson.

Articles of Association and Incorporation: Mr. J. S. Dow, Mr. J. Eck, Capt. W. J. Liberty, Mr. C. C. Paterson and Mr. C. W. Sully.

Leon Gaster Memorial Fund: Mr. A. Blok, Mr. J. S. Dow and Mr. H. H. Thompson.

The two *ad hoc* committees will automatically dissolve after their tasks are completed; other committees will be elected annually by the Council.

The Technical Committee, which is a new departure, has held several meetings. It has mapped out a comprehensive scheme of work which should afford an opportunity for useful co-operation on the part of other members of the Society. It has also been entrusted by the Council with the task of revising the reports on the lighting of schools and libraries issued by joint committees of the Society prior to the war. For this purpose two sub-committees, constituted as follows, have been formed and are now at work:—

School Lighting Sub-Committee: Mr. A. Blok, Mr. W. J. Jones and Mr. E. L. Oughton (The Illuminating Engineering Society); (*Co-opted*) Dr. A. H. Levy, Mr. T. E. Ritchie (Illuminating Engineering Society), Dr. E. H. T. Nash (Medical Officers of Schools' Association), Mr. J. C. Buckley (London Teachers' Association).

Library Lighting Sub-Committee: Dr. S. English, Mr. P. Sugg and Mr. G. H. Wilson (The Illuminating Engineering Society); (*Co-opted*) Mr. J. Eck (The Illuminating Engineering Society), Mr. J. Wilks (The Library Association), Mr. D. S. Young (The Library Association).

The Leon Gaster Memorial Fund.

The appeal issued in October last on behalf of this fund, which is intended to commemorate the great services rendered to the Society by its founder, the late Mr. Leon Gaster, has met with a generous response. The sums received or promised now amount to more than £250, and the fund will be closed at the end of the present session. It is naturally to be desired that every member of the Society should be associated with this effort to commemorate the services of its founder, and the Hon. Secretary will welcome any additional subscriptions up to July 1st, 1930.

The interest on this fund is to be applied to the annual award of a Leon Gaster Premium for the best contribution on any aspect of illuminating engineering submitted to the Society during the year, which will be accompanied by an inscription on vellum recording the award. It is hoped that arrangements in connection with the fund will be completed in time for an award to be made during the session 1930-1931.

Meetings of the Society.

The programme of papers for the past session has again been of a varied and interesting character. The opening meeting on October 8th was, as usual, devoted to a report on progress, which was supplemented by a series of exhibits illustrating recent developments in illuminating engineering. The preparation of the report of progress was on this occasion undertaken by the Papers Committee. It was felt, however, that this task would be lightened, and a better report would result if the collection of information could be delegated to a larger number of members. At the suggestion of the Papers Committee it has therefore been agreed that the preparation of the report will in future be undertaken by the Technical Committee. A panel of reporters, each of whom will have special knowledge of the section with which he deals, is now being formed.

The second ordinary meeting, on October 22nd, was devoted to a paper on "The Nature and Effects of Glare," by Mr. W. S. Stiles, which was illustrated by numerous demonstrations. On December 10th the practice initiated in recent sessions of holding a general discussion on "Problems in Illuminating Engineering" was followed. The introductory contributions, seven in number, were of exceptional interest. Professor H. Robertson and Mr. B. Ionides contributed illustrated accounts of the lighting of the Savoy Hotel and theatre; Mr. A. Cunnington dealt with the problem of illuminating large vertical placards, station name plates, etc.; Mr. E. Stroud described a novel form of hospital lighting unit; Mr. F. C. Smith gave an account of the lighting by gas of a large sign outside Watson House; and Mr. S. G. Elliot illustrated some novel methods of lighting employed in the new Underground Railways building at St. James's Park. A feature which added to the interest of Mr. H. L. Stallan's contribution on the lighting of motor-buses was the exhibit, by the courtesy of the London General Omnibus Company, of one of the latest types of buses, equipped with a pleasing system of concealed lighting by means of lamps concealed behind celluloid encircling the interior of the bus.

On January 21st members had the pleasure of hearing a paper on "The Art of Stage Lighting," by Mr. Harold Ridge, in the model theatre of the Royal College of Music. This paper gave rise to an excellent discussion.

The remaining three papers, "Modern Incandescent Lighting in Kinema Studios," by Mr. W. A. Villiers (February 18th), "The Lighting of Textile Mills," by Mr. S. Anderson (March 25th), and "Luminous Traffic Signals," by Mr. T. Austin (May 6th), all proved to be of considerable interest. The paper by Mr. Villiers was supplemented by a comprehensive display of lighting units utilized in kinema studios; whilst Mr. Anderson's paper, which was very fully illustrated by lantern slides, contained much detailed information on the lighting conditions prevalent in the textile industry.

In addition to the ordinary monthly meetings, visits to several places of interest were arranged. Facilities were kindly accorded for parties of members to inspect the Post Office (London) Railway, adapted for the underground conveyance of mails, on two occasions, November 27th and January 28th. By the courtesy of Sir Peter Chalmers Mitchell, Secretary to the Zoological Society of London, a visit was paid to the Gardens after hours on January 16th. Members much appreciated this opportunity of studying the pleasing artificial lighting of the aquarium, with the aid of the Director, Mr. B. Boulenger, and examining the special lighting and heating arrangements in the reptile house.

The thanks of the Society are due to Mr. Boulenger, director of the aquarium, and to Mr. E. L. Randall, a member having special knowledge of the lighting arrangements in both sections, who accompanied the party during their tour.

Meetings in Provincial Centres.

In accordance with the policy, initiated during the preceding session, of holding special meetings in the provinces, two gatherings were arranged at Birmingham, on October 22nd and January 24th. On the first occasion, when the President took the chair, Mr. Waldo Maitland read a paper on "Architectural Lighting." At the second meeting, which was presided over by Mr. D. R. Wilson, a paper on "Some Aspects of Industrial Lighting" was read by Mr. E. A. R. Werner (H.M. Inspector of Factories for the Midland Area). At both meetings there was an excellent attendance, and the hope was expressed that Birmingham would be the first area to form a local branch of the Society.

It is hoped that during the coming sessions several special meetings will be arranged at various cities in the North of England and Scotland. Subjects of local interest will be discussed.

The Annual Dinner.

The Annual Dinner, which took place at the Princes' Galleries, Piccadilly, on February 12th, proved to be an enjoyable and successful event. There was an attendance of about 150 (more than in any previous year, with the exception of 1929, when the Society was celebrating its twentieth anniversary), and a number of distinguished guests were present. The toast of "The Illuminating

The Illuminating Engineering Society

32, VICTORIA STREET, LONDON, S.W.1

Dr. INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST DECEMBER, 1929 *Cr.*

EXPENDITURE	£ s. d.	£ s. d.	INCOME	£ s. d.
To Administration Expenses			By Subscriptions	568 6 3
Clerical Assistance	72 0 0		,, ,, outstanding estimates	15 0 0
Printing	70 1 3		,, Sustaining Members	338 15 0
Duplicating	14 11 3		,, Interest on Deposit	10 11 10
Postage and Petty Cash	49 18 6			
Hire of Halls for Meetings ...	21 9 0			
Reports and Lantern Operators...	23 15 0			
Refreshments at Meetings ...	42 1 0			
Bank Charges	8 9			
		294 4 9		
,, Provincial Meetings Expenses				
Hire of Halls	3 13 6			
Printing, Reporting and Lantern Operator	4 18 1			
Travelling Expenses, etc. ...	4 0 0			
		12 11 7		
,, Expenses *re* Gaster Memorial Fund				
Postage and Petty Cash	7 16 0			
Printing and Duplicating ...	3 7 6			
		11 3 6		
,, Annual Dinner	132 13 11			
Less Receipts	129 5 0			
		3 8 11		
,, Illuminating Engineering Publishing Co., Ltd., Share of Subscriptions		293 14 0		
,, National Illumination Committee		32 0 0		
,, Excess Income over Expenditure for the Year		285 10 4		
		£932 13 1		£932 13 1

The Illuminating Engineering Society

32, VICTORIA STREET, LONDON, S.W.1

BALANCE SHEET, 31ST DECEMBER, 1929

	£. s. d.	£ s. d.		£ s. d.
Creditors		21 6 9	Cash at Bank	
Subscriptions paid in advance...		2 2 0	Current Account	121 2 10
			Deposit	400 0 0
Capital Account			Cash in Hand	7 6 9
Balance from last Account ...	237 19 3		Subscriptions outstanding, estimated ...	15 0 0
Adjust in respect of outstanding	6 11 3		Sustaining Member outstanding	10 0 0
Excess Income over Expenditure for the Year	285 10 4			
		530 0 10		
		£553 9 7		£553 9 7

LEON GASTER MEMORIAL FUND ACCOUNT, 31ST DECEMBER, 1929

	£ s. d.		£ s. d.
Subscriptions Received	214 10 9	Cash on Deposit	214 10 9

We have examined the above accounts with books and vouchers, and certify same to be correct in accordance therewith, and that the Balance Sheet exhibits a true and correct view of the Society's affairs according to the information and explanations given to us.

Dated this 21st day of March, 1930.

ROBERT J. WARD & Co., *Chartered Accountants*,
10, Serjeant's Inn,
Fleet Street, London, E.C. 4.

Engineering Society" was proposed by Sir Thomas F. Purves, O.B.E. (President of the Institution of Electrical Engineers). The President, in responding, alluded to the gratifying progress that had been made during recent years, and to the forthcoming International Illumination Congress in 1931, in which the Society would naturally take an active part. The toast of "The Guests" was proposed by Mr. C. C. Paterson, and was coupled with the names of Dr. F. E. Smith (Secretary of the Department of Scientific and Industrial Research), Mr. Harold E. Copp (senior Vice-President of the Institution of Gas Engineers), both of whom congratulated the Society on the work it was conducting, and wished it even greater prosperity in the future.

Those present then adjourned for dancing, and the latter part of the evening proved to be as enjoyable as the preceding one.

Conferences and Exhibitions.

The Council have designedly confined this report to the proceedings of the Society, leaving the survey of other aspects to the report on progress, which will be presented at the opening meeting in the autumn. It may be well, however, to mention one or two conferences and exhibitions at which lighting was discussed, and in which members of the Society took a leading part. Amongst these may be mentioned the annual conference of the Association of Public Lighting Engineers, held in Bournemouth during September 9th to 12th; the Public Works, Roads and Transport Congress, held in London in November last, when a paper dealing with street lighting and traffic signals was read by Mr. W. J. Jones; and the annual congress of the Royal Sanitary Institute, at which a paper on industrial lighting was read by Mr. L. B. W. Jolley and Mr. G. H. Wilson. Another outstanding event was the Industrial Lighting Exhibition, organized by the Ministry of Labour for Northern Ireland, in Belfast, during January 14th to February 12th, when an introductory address was delivered by Mr. D. R. Wilson, and other members of the Society took an active part in the arrangement of demonstrations.

Increase in Membership.

The Council is pleased to be again able to record a steady flow of new members. Yet this increase, whilst encouraging, falls short of what is desired if the Society is to assume the important position which the value of its work demands.

It has been evident that public interest in this work is continually increasing. The Council is therefore confident that if members will do their utmost to bring the Society to the notice of friends to whom this work is of value a very substantial increase in membership should ensue during the next session.

Financial Position.

The accounts for the past financial year, which are attached to this report, have been duly audited by Messrs. Robert J. Ward & Co., chartered accountants, who have kindly consented to act as Honorary Auditors of the Society. The Council desire to take this opportunity of thanking the Hon. Auditors for their valuable services, and also of putting on record their appreciation of the efficient manner in which the accounts have been kept by the Hon. Secretary and his staff.

It will be observed that further progress has been made towards consolidating the financial position of the Society. The income for the past year shows a satisfactory margin over expenditure, and at the end of the financial year a sum of £400 had been placed on deposit. The total revenue received (£932 13s. 1d.) was somewhat less than that for the previous year. But this is due to the fact that in the previous year several exceptional amounts, in the form of donations, life-memberships and arrears of subscription were received.

Taking into account these factors, it is evident that the revenue has been fully maintained, and the present financial position may be considered very satisfactory.

At the same time it is well to remember that, with the increasing activities of the Society, its expenditure will necessarily tend to increase, and that, therefore, no opportunity should be lost of strengthening the present position. This is especially desirable in view of the fact that the Society will feel it incumbent to undertake some share in the expenditure involved in the International Illumination Congress (1931). The Council has already intimated its intention of making a substantial contribution to the funds of the Congress.

Programme for Next Session.

The Papers Committee is already engaged in preparing the programme for the next session, and has already received offers of several interesting papers. The Hon. Secretary will be pleased to hear from any members or others prepared to read papers or initiate discussions, and the Council would welcome any suggestions in regard to the programme for 1930-31, which will receive the careful consideration of the Council.

The International Illumination Congress (1931).

A considerable amount of preparatory work in connection with the International Illumination Congress, which is to be held in this country during September 3rd to 13th, 1931, has already been done. Members of the Society are serving on a number of the committees engaged in this work. A preliminary notice, which has been published in the journal of the Society, indicates that the programme will include a tour of places of interest in England and Scotland, so that other cities besides London will share in the work of the Congress. The Congress will be followed by the technical meetings of the International Commission on Illumination, which will be held in Cambridge during September 13th to 19th. Fuller details of the programme will doubtless be available shortly. The Congress will doubtless prove to be the most important event in connection with illuminating engineering that has yet taken place in this country, and it is hoped that all members of the Society will do their utmost to render it an outstanding success.

JOHN W. T. WALSH, *President.*
J. S. DOW, *Hon. Secretary.*

Application for a Licence of the Board of Trade *

Notice is hereby given that in pursuance of the 18th section of the Companies Act, 1929, application has been made to the Board of Trade for a licence directing an Association about to be formed under the name of

"THE ILLUMINATING ENGINEERING SOCIETY"

to be registered with Limited Liability without the addition of the word "Limited" to its name.

The objects for which the Association is proposed to be established are :—

To promote the general advancement of illuminating engineering and the utilization of natural and artificial light and the dissemination of knowledge relating thereto, and for that purpose :—

(*a*) To hold meetings of the Society for reading and discussing communications bearing on illuminating engineering and the utilization of natural and artificial light, or on subjects relating thereto;

(*b*) To hold or promote congresses on illumination and exhibitions of lamps, lighting appliances, instruments or other devices or applications connected with illumination;

(*c*) To print, publish, sell, lend or distribute the proceedings or reports of the Society or any papers, communications, works or treatises on illumination and its applications or subjects connected therewith, in the English or any foreign language, or any abstracts thereof, or extracts therefrom;

(*d*) To make grants of money, books, apparatus or otherwise for the purpose of promoting the advancement of knowledge of illumination, or invention and research therein, or in its applications, or in subjects connected therewith;

(*e*) To invite the co-operation of kindred, scientific and technical bodies, by inviting the presence in an advisory capacity of representatives of such bodies on committees or on the Council, or by other methods calculated to promote the objects which the Society has in view.

The other objects of the Association are set out *in extenso* in the Memorandum of Association, a copy of which may be inspected at the office of Messrs. Radcliffes & Hood, St. Barbe Sladen & Wing, 10, Little College Street, Westminster, S.W.1.

Notice is hereby further given that any person, company, or corporation objecting to this application may bring such objection before the Board of Trade, on or before the 10th day of July next, by a letter addressed to the Comptroller of the Companies Department Board of Trade, Great George Street, London, S.W.1.

Dated this 17th day of June, 1930.

JOHN S. DOW,
Hon. Secretary.

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* This notice is being advertised in the daily press in accordance with the requirements of the Board of Trade.

Luminous Traffic Signals

By T. AUSTIN

DISCUSSION

(In what follows we give an account of the discussion of the above paper by Mr. T. Austin, read before the Illuminating Engineering Society on May 6th and published in our last issue (pp. 142–148.)

Mr. A. CUNNINGTON (Southern Railway) said that the problems dealt with in Mr. Austin's paper were of primary interest to those concerned with signalling work. He would, however, like to refer to one point that had a bearing on signalling problems, namely, the desirable intensity of signalling beams for day and night use. A light strong enough to show up well in bright sunlight might be so powerful as to have a distinctly glaring effect in the night time. He had heard that drivers had complained that the effect of such lights prevented them seeing the stopping mark, which indicated where trains of a particular length should be pulled up. This stopping mark was at some distance from the signal itself and was separately illuminated, but it was sufficiently near to be rendered inconspicuous by an adjacent coloured signal. He wondered whether it would be practicable to adopt two intensities, one for daylight use and the other, less powerful, for use at night.

Mr. L. J. BOUCHER (Signals Department, Southern Railway) congratulated Mr. Austin on his paper, which was extremely interesting to him. Colour-light signalling had proved quite successful on the Southern Railway, where multiple aspect signals were in use. He would like to ask Mr. Austin how it was possible to avoid the momentary flash of " red " when changing from the green to the yellow signal?

Commander HAYDN T. HARRISON said that the paper was of great interest and contained an extraordinary amount of valuable information. During a good part of the war he had been responsible for the signal lamps in the navy. The signalling was done on a large scale over very long distances and at very high speed. A great compliment had been paid to one particular make of signal lamp in that it had been adopted by the army and the navy in very large quantities. The angle was slightly less than the six degrees mentioned by Mr. Austin as the minimum. It had a visibility at night of many miles at a consumption of thirty to forty watts. Altogether this signalling lamp was a wonderful piece of work. Its success was due to the fact that the lamps were so constructed and located that they must be in focus with the reflector under any conditions. They could be set in the manufacturers' works so that they would focus dead on the spot. When put into their holders, whether at sea or at the front, the lamps always slipped into the correct position. He considered that the focussing of lamps in signalling was not a matter to be dealt with in the locality where they were erected, but was a question of so constructing them that there could be no mistakes.

The section of the paper dealing with railway signalling appealed to him most. It was a question of obtaining concentration of light so as to secure the maximum illumination for the energy supplied. When alternating current was available one could adopt transformers so as to reduce the energy, but there was the further question of diminishing the size of the filament. There had been a good deal of research work done on this subject in the navy, and dispersion could be limited to six degrees. The shape of the area that it was desired to illuminate was taken into consideration. The roll of the ship was rather a troublesome thing to contend with, rendering a wider dispersion necessary in the vertical plane. In the case of work on land this vertical range could be dispensed with to a large extent, because the height of the signals was not very great compared with the distance for which one wanted to make them visible. A distance of 4,000 feet could be covered by a very small angle when dealing with a height between 10 and 30 feet. With highly concentrated beams the shape of the filament was practically reproducible in the case of the signalling lamp referred to. The shape was perfectly clear with any screen that could conveniently be devised. In railway work one naturally wanted to cover width, whereas the height covered was limited. He would like to have Mr. Austin's views on the question of glare and a definite " cut off." He assumed that in railway work it was an advantage to diminish the apparent brilliancy of the beam considerably as the source of light was approached.

He noticed that the author had stated that the outer cover lens was tinted a light yellow, which, it was claimed, led to better penetrating power in misty or foggy weather. The author did not definitely say whether it had this advantage or not. On the same page there was the statement, " A 5⅜-in. inverted toric lens is supplemented by a cover glass of special ' no-glare ' composition, which gives the light transmitted a slight yellowish tinge." The question was one of the greatest importance and he would like to know whether there was any definite data on the point. Visibility was quite a different problem from penetration.

In regard to the height of signals in railway work, he believed that with semaphore signals the height was as much as 40 feet. That, he supposed, was to bring them against the sky line. He thought that in the case of luminous signals a great height would be a disadvantage, except possibly from the standpoint of reducing the glare as the signals were approached. He noticed in the slides put on the screen that the light signals were not particularly high.

Road signals for fast traffic obviously could not be put out of the field of view. There was, however, the question of glare. The driver needed to be able to see the road as well as the signal.

Mr. H. H. HARRISON said that the paper covered the ground of luminous signalling in an excellent manner and was non-controversial. The first example of luminous signalling was the Greek method of telegraphing by means of a water clock and lighted torches which were thrown up at certain intervals.

The words " arresting feature " were used in the paper. The best example of that was to be found in a telephone exchange at night when there was little traffic and the operating staff was reduced to possibly only one or two. The instant a lamp signal lit up at the far end of the room it arrested attention. He thought that stress should be laid on the insistent feature of luminous signals as compared with a mechanical signal such as a semaphore.

Reference was made in the paper in connection with route signalling to monochrome indicators. The latest application of luminous signals was in connection with the totalizator. A tentative specification issued some fifteen months ago said the indications on the totalizator must be visible up to 50 yards. They were made visible by means of luminous monochrone signals up to many times 50 yards, actually about 1,600 feet.

Mr. H. GUNNER said the paper was a very interesting and practical one, especially in its treatment of road signals. He thought that if what had been brought before the meeting could be adopted universally it would overcome many of the difficulties encountered. He was afraid that until uniformity of action could be achieved there would still be trouble.

Mr. G. TWEEDIE (Institution of Railway Signal Engineers) remarked that the paper dealt with one subject with which some present were very familiar and with another on which they knew less, namely, street-traffic regulation. As a motorist he felt that the regulations were becoming complicated. He would appeal to those who had anything to do with the introduction of luminous signals for street traffic to consider whether that was not so, and also whether signals were not being

made too powerful. He was driving through Exeter last year in the height of the summer traffic when his wife told him that there was a board on a wall to show that he was approaching an automatic signal. He had been so occupied in dodging the traffic that he had not noticed it. A notice on a coloured board might easily be overlooked. He had come through all right because he was connected with railway signalling, but how in the world ordinary motorists managed he did not know. At present, he must confess, he preferred a police officer! He had sat outside a café in Paris and watched the automatic signals. In some cases there was a warning bell. There was a limit, he thought, to the introduction of complicated novelties. Simplification and standardization were desirable not only to avoid accidents, but also to diminsh delays.

Were there available any data with regard to experiments with standard long burning oil lamps and the use of improved lenses? Since the war lenses had been enormously improved. He believed that a standard yellow had been adopted which was considered to have the maximum penetrating power in fog. Some doubt had been expressed as to whether yellow was "penetrating," but in practice one found that if a yellow cover was put on the headlights one could get along in fog, whereas with a brilliant white light one could not. The selection of the right "yellow" was, however, of importance. He would like to know how Mr. Austin defined "range of visibility."

Turning to questions of design, Mr. Tweedie mentioned one form of light signal which gave an excellent light with 12 watts. Reflectors constantly used in a thick atmosphere were liable to deteriorate. He did not know whether stainless steel would solve this difficulty.

Mr. J. M. WALDRAM said that he wished to join with other speakers in thanking the author. Recently he had had occasion to read a lot of literature in connection with railway signalling. A series of experiments had been carried out lately in connection with the penetration of signal lights in misty weather, and the question had been carefully studied. It had been found that the use of a red filter on white light did not increase the penetration. A distinction should be drawn between signals and headlights. One did not use headlights to look at but to see by. When a white light was used in fog there was a good deal of "back flare" from the lamp, but the problem here was quite distinct from the observation of distant signals.

He did not know whether it had been found necessary to increase the power of the green indication. He took it that the Hall signal was limited to three indications, as there were only three colours available for long range work. He would like to know whether there was any difference in the tolerances required in focussing for lights of different colours.

Some people in this country were very sceptical as to the possibilities with regard to street signals. In America he had gone up the Cleveland Terminal Tower and had a remarkable view of the street-traffic signalling in practically the whole of the city. Nobody who had seen the system at work in Boston, which was as irregular a city as London—so irregular that even Americans lost their way!—would have any doubt that it was a practical proposition. One was able to drive for some miles with hardly a check. Single or unconnected signals might, however, lead to trouble. He sincerely hoped that systems involving the ringing of bells would not come into use.

The differences between railway signalling and street-traffic signalling had been pointed out by the author, and he was sure that it was a necessary matter to consider. Drivers of trains were in a very different position from drivers of cars. Train drivers knew exactly where to look for signals. He thought it very necessary to have three unmistakable indications. It must be remembered that a car could be steered, whereas a train could not, and therefore the possibility of avoiding accidents in the case of a car was considerably greater. He believed that the semaphore system was used a good deal on the west coast of America, and many had seen it in use at Brighton.

Lt.-Col. K. EDGECUMBE: One speaker had said that he preferred the police officer on point duty because he was more visible. The police officer was certainly more audible, but he did not agree that he was more visible. If one did not see the policeman's hand held out there was the very dickens to pay. The lamp signal had the advantage that it could not answer back. (Laughter.) He found some difficulty in getting into a small modern car and when he got in his head was brought right against the roof; therefore it was most important from his standpoint that the signal should not be put too high.

Mr. Austin had pointed out the advantages of synchronized control whether staggered or progressive, and had said that to work it there must be two wires running the length of the signals. The motor which Mr. Austin described as synchronous was an induction motor and not truly synchronous, but many were truly synchronous.

Mr. R. N. SAXBY said that the paper was a most instructive one. He had intended to raise the question of the visibility and penetrability of red and yellow light, but that had been dealt with. He thought that some were confusing the difference between yellow light as generated at the source and yellow light obtained by filtering white light through a yellow screen. If in foggy weather one went a sufficient distance away from a white light it was probably seen as yellow because the yellow part of the spectrum, and particularly the red part, would be transmitted to a greater distance.

The portion of the paper which most interested him was that which dealt with street-traffic control. A type of controller had been developed which had no synchronous motor or motor of any description. The technical features of this system were briefly described by Mr. Saxby, who explained how by bridging Neon lamps with a high resistance and a condenser the time occupied by the complete cycle could be readily varied. The apparatus was simple and cheap. He thought that some such scheme as he had described was necessary in order to make traffic control a reasonable proposition. The capital cost would be compensated for in a very short time because the salaries of policemen, amounting in the case of two to about five hundred a year, would be eliminated. The question of cost was an important one to local authorities.

Mr. A. E. TATTERSALL (North-Eastern Area, London and North-Eastern Railway): So far as railway signals are concerned, Mr. Austin deals with the subject in a very adequate and complete manner. There is one phase of the subject, however, Mr. Austin does not deal with and which is destined to become very prominent in the near future. Up to the present the cost of installing colour-light signals has been fairly expensive and their use could only be justified financially in locations where either extra track capacity was required or where a re-signalling scheme warranted the financial outlay. The cost of the signals themselves was not out of the way, but the provision of the necessary track circuiting and power supply rendered such installations very costly, and consequently, with the notable exception of the Southern Railway, colour-light signal installations have had a very strictly limited application.

In order to obtain the advantages accruing from colour-light signals in the U.S.A., extended experiments have been made with a lamp equipped with the decentred Corning-Labby mirror. This lamp takes the place of the ordinary long-burning signal lamp, the ordinary mechanical signal fittings where necessary being retained.

It is found that one of these devices fitted with a 3½-volt .3-ampere lamp will give a beam of 800 candle-power, and with an 8-volt 5-6-watt lamp a beam of 22,000 candle-power, so that it will be appreciated this arrangement is eminently suitable for battery lighting.

An extended trial has also been made of these lamps on the L.N.E.R. (N.E. Area) and the results have been entirely satisfactory. It was considered that the results obtained were quite equal to the results obtained from

the colour-light signalling and at a much reduced cost. I should be pleased to furnish a detailed description of the lamp if desired.

Mr. T. AUSTIN, in reply: In reply to Mr. Cunnington, I would say that it is usual at interlockings and other places where the number of lights to be observed would be confusing to reduce the voltage on the lamps of colour-light signal at night. This is effected by simply switching in a resistance to reduce the voltage across the lamps. The switch is usually in the signal cabin, and is operated by the signalman.

Mr. Boucher mentions the flash of red when changing from yellow to green in the single-lens type of signal. It is true that the red can be seen momentarily when the change is taking place, but it occurs so quickly that it is almost idle to regard this point as a disadvantage of the single-lens signal. The amount of red to be seen would certainly not confuse a driver, and the larger number of this type of signal already in use seems to be sufficient evidence that the feature mentioned is not a detriment to the signal.

Commander Harrison has given some very interesting particulars of the signalling lamps used in the Navy, for which I am grateful. The lamp used in railway signals, like those used in the signalling lamps referred to by Mr. Harrison, are also carefully focussed at the works, so that within narrow limits each lamp is identical, and consequently no focussing is required in the field.

With regard to the question of glare, the point did not arise in the daytime, and one very rarely received complaints from drivers of there being "too much signal." At night-time, however, it was possible, and usual, to reduce the amount of light emitted by the signal in the manner described in the reply to Mr. Cunnington.

With regard to the penetrating power of a yellow light, I can only state that the transmission value of the yellow used for signalling purposes is approximately 50 per cent. greater than that of the red, and that in the case of the signal referred to, where the cover lens is tinted a light yellow, this has been arrived at by experiment, and has been found an advantage.

With regard to the height of the light signal for railway work, it is definitely a disadvantage to put the signals at a great height, and obviously the nearer the signal is to the line of the driver's vision the more effective it will be.

One advantage of light signals, as far as railway signalling is concerned, is that the structure to carry the signals can be much lower and less bulky, and they are consequently less costly and give a cleaner construction than is the case with the manually operated semaphore signals. I am obliged to Mr. H. H. Harrison for his description of the monochrome indicators used in connection with the totalisator.

Mr. Tweedie asks for a definition of "range of visibility." This factor is obviously an arbitrary one, but could be defined as the distance at which the indication given by a signal could be regarded as an unmistakable instruction to a driver. With regard to the utility or otherwise of street-traffic signals, experience has yet to prove their advantages or otherwise. The position of a street-traffic signal is obviously of the utmost importance, but it is equally important that the road-using public should be aware of the existence of street signals in a particular town.

A large amount of work has yet to be done in the way of educating the public of this country in the use of mechanical devices for the regulation of traffic, and the fact that it has been accomplished in the United States in so successful a manner is evidence that it may not be impossible to effect some improvement in the regulation of traffic at a nominal cost in this country.

I am extremely grateful to Mr. Waldram for his helpful contribution, giving his experiences in America, particularly with regard to the street-traffic signals. Regarding his query about the Hall signal, he is correct in assuming that it is limited to three indications, but if a fourth indication is required then a fixed unit is used and is switched on as required.

With regard to his query as to the difference in the tolerances required in focussing for lights of different colours, I believe there is a difference, but I have no data to show what the difference is. This feature does not, of course, affect the multiple-lens signal, in which each lampholder is adjusted to give the best value with its own particular colour, but it does probably affect the efficiency of the single-lens signal. I do not, however, think that it is any serious disadvantage.

I have to thank Mr. R. N. Saxby for his interesting description of the street-traffic controller using a neon lamp in conjunction with a high resistance and condenser for obtaining a time interval.

Mr. A. E. Tattersall has mentioned a type of signal lamp which I had overlooked, namely, a high-efficiency reflector lens unit, employing a low-wattage lamp for use behind the spectacle of an ordinary semaphore signal. The use of this unit virtually converts a semaphore type of signal into a day colour-light signal at a cost of very small energy consumption, and has the advantage that existing posts and other equipment can be used.

I do not agree with Mr. Tattersall that colour-light signalling installations have a strictly limited application, in view of the large number of installations already in use and contemplated. It is agreed, however, that, as mentioned in the paper, the successful and economical use of colour-light signals is dependent upon an ample supply of cheap electricity.

Street Lighting and Illuminated Traffic Signals in Relation to Prevention of Accidents*

By ROBERT BEVERIDGE

(Inspector of Lighting and Cleansing, City of Edinburgh).

STREET lighting was probably among the first of our municipal activities to be organized as a public service about a century and a half ago. It was primarily organized for the convenience of the residents within a specified area, and even in those early days its contribution to the growth of social intercourse must have been considerable. Having entered into our communal life as more or less of a luxury, street lighting came in time to be regarded and established as a necessity. The police authorities must have quickly discovered in it a useful ally; hence the allocation by so many town councils of one committee for the administration of watching and lighting. To-day the officials in charge of public lighting have a particular interest in everything that affects the traffic problem and are helping in no small measure to give material expression to the ideals of the Safety First movement. The public lighting service is also intimately related to traffic affairs, including the prevention of accidents—an aspect which has perhaps been rather overlooked in the past.

During the few years that have elapsed since the Association of Public Lighting Engineers came into existence it has been chiefly engaged in developing the all-round improvement of street-lighting apparatus and in promoting a better conception of what good lighting implies. Future developments in street-lighting equipment will be based on scientific principles and directed on the most efficient lines. It is, however, at present impossible for local authorities to deal

* Abstract of a paper presented at the National Safety First Congress, held in Liverpool during May 20th-22nd.

adequately with the lighting problems presented by the changing conditions of the present day. An instance is afforded by the arterial roads, now encountered in all parts of the country and constructed under the artificial stimulation of Government subsidies, without regard to the facilities for providing and maintaining illumination. The development of these broad highways has been gratifying to the motorist, but has increased the risk to the pedestrian in a greater ratio than the actual distance he has to traverse in crossing the widened roadway. If the lighting of these roads had been given consideration prior to their construction a surfacing material more appropriate for efficient lighting than the usual tar macadam might by now have been discovered. Whilst one may congratulate road engineers on producing a relatively dustless, smooth and hard-wearing surface, the colour leaves much to be desired from the lighting standpoint. A dead black or even polished surface is the worst conceivable background for showing up any object upon it. The difficulty in distinguishing a person wearing dark clothes owing to his merging in the darker background of the road surface has undoubtedly caused many accidents. The problem of providing the desired contrast seems at the moment incapable of solution, but like all other problems is more likely to yield if fully recognized and carefully kept in view. Other improvements, excellent in their way, tend to increase the difficulties of pedestrians Amongst these is the treatment of corners by setting back the building line and the production of open junctions and intersections. Another special problem is presented by the main road where building developments have hung fire and which is provided with a footpath and street lamps of low capacity on one side only. Pedestrians are then liable to walk on the roadway instead of the single footpath, and the inadequacy of the lighting is apt to encourage an unjustified sense of security. All these changes are taking place more quickly than the average local authority can keep pace with them and the pedestrian is not enjoying the measure of street lighting necessary to ensure his safe use of roads and streets. The Road Fund could surely be legitimately called upon to subscribe towards the lighting, which is after all only the completion of the otherwise splendid roadways which it has brought into being. Where these wide roads are to be constructed, within certain areas at any rate, the lighting facilities should be one of the first considerations and the cost should form one of the essential components of the expenditure.

In the next section of his paper Mr. Beveridge alluded to the use of very powerful motor car headlights, without any legislative restraint; that the conditions are not worse than they are is a tribute to the good sense of drivers.

Turning to traffic signals, the author mentioned as a significant fact that the number of vehicular accidents has not been increasing of late in nearly the same proportion as the volume of traffic. It can even be claimed —and Edinburgh appears to be pre-eminent in this respect—that the accident curve is on the down grade, in spite of the larger number of vehicles on the road. The conclusion is that where traffic control has been intelligently exercised the casualities have been reduced. Automatic signals have fully justified their erection in Edinburgh. There are 17 sets in the city and others on order, and the Chief Constable's report shows a decided diminution of accidents at these points. One of the first essentials in the use of fixed signals or devices for the control of traffic is uniformity in construction and application. At present there is great diversity, and the Ministry of Transport has only ventured on making recommendations towards uniformity and has not contemplated compulsory action.

The author also described several special arrangements devised in Edinburgh to promote safety. A succession of accidents at certain T-shaped junctions, where drivers were apt to indulge in " cutting the corner " had been noted. A lamp was installed showing a " Drive Left " sign on three sides, and this is being used at a number of dangerous junctions. This device not only guides the driver to his proper side when he might be inclined to stray but afford the pedestrian a safe halting place. The best justification for the multiplication of such signs in Edinburgh is to be found in the fact that for three years in succession the street accidents in that city have shown a decrease!

Considerable attention has been given to the project of " floodlighting " constables on point duty from below the street surface, instead of erecting an additional lamp standard. The necessity for such lights is becoming less owing to the release of men from point duty following the adoption of automatic control, but the idea has other possibilities. At an ordinary right-angled junction where the road is not sufficiently wide to warrant the erection of a " Drive Left " signal, sunk lights in the roadway would have the effect of dividing the traffic and would undoubtedly contribute to the prevention of accidents.*

Other applications of light in the interests of safety will readily suggest themselves. It is now becoming usual to prescribe definite crossing points for pedestrians in exceptionally busy streets. Indications of such crossing routes should be distinguishable by night as well as by day, and the notices should be adequately illuminated. In a memorandum recently issued by the Ministry of Transport on the standardization of traffic notices, etc., particulars of notice boards bearing the wording " Please Cross Here," which have become familiar in London streets, are issued for the guidance of the provinces. Translucent lettering on the surface of the roadway or kerb would, however, furnish a better solution of this problem. In the memorandum referred to it is stated that reflectors " can be usefully employed." They are not even recommended, much less made compulsory! Surely if it has been judged necessary to erect a notice to warn drivers of danger it would be worth a few shillings more if the lettering were made effective by night as well as by day!

Other suggestions made in the final portion of the paper relate to the use of distinctive lights for safety islands, and the adoption of a standard height for the installation of " Drive Left " notices or other instructions to motorists.

Recommendations for the Standardization of Road Direction Posts, Warning Signs and Traffic Notices

Memorandum No. 291, recently issued by the Ministry of Transport, deals with many forms of signs and traffic notices, namely, (i) road direction posts, (ii) advance direction signs, (iii) safety posts, (iv) warning signs and notices, (v) special cautionary signs, (vi) village and place-name signs, (vii) signs for diverting traffic, (viii) signs for use at " roundabout " centres and in " one-way streets," (ix) markings on carriageways in connection with (viii), (x) signs for pedestrians, (xi) flashing beacons, (xii) markings of limits of cab ranks, (xiii) signs for parking places, (xiv) light-signals for traffic control and (xv) " white lines " on highways.

Useful general recommendations are made (e.g., all signs should be visible to traffic at a distance of at least 100 yards; posts carrying traffic signs should be distinctly marked in black and white; signs may be attached by brackets to private premises so as to diminish the number of posts; the erection of unauthorized signs by private individuals and associations should be discouraged). A series of 21 diagrams showing types and dimensions of signs and notices completes the memorandum, which should help towards bringing about uniformity. It is stated that " where a means of illumination is readily available signs at important road junctions and those erected to indicate specially dangerous features should be illuminated at night." This might, perhaps, have been put more strongly and some hints on methods of illumination might be useful.

* It is interesting to note that both these ideas, i.e., the illumination of officers on point duty from below and the use of a line of sunk lights to divide the traffic, have been recently adopted with success in Continental cities.—ED.

POPULAR & TRADE SECTION

COMPRISING

Installation Topics—Hygiene and Safety—Data for Contractors—Hints to Consumers

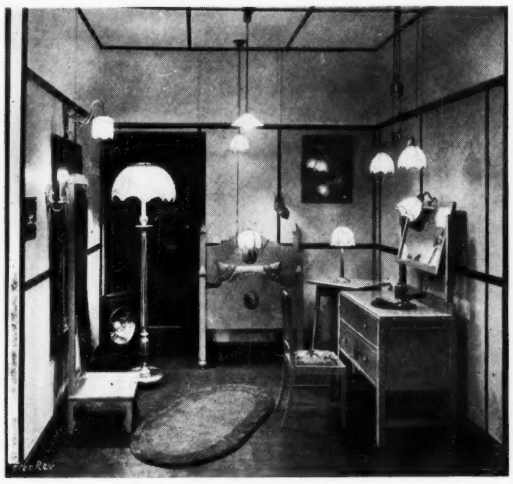
(The matter in this section does not form part of the official Transactions of the Illuminating Engineering Society and is based on outside contributions.)

A Lighting Service Bureau in Johannesburg

(Contributed by the E.L.M.A. Lighting Service Bureau.)

AN important step forward in electrical development in South Africa was made last month when the S.A.E.L.A. Lighting Service Bureau was opened by the Mayor of Johannesburg.

The Bureau is located on the first floor of Crown House, in President Street, in commodious premises opposite the main entrance of the City Hall, and the excellent position secured should be a considerable help to its activities.



The Model Bedroom.

The Lecture Theatre.

A South African Lighting Service Bureau

The opening ceremony was attended by a representative gathering, which gave the Bureau an enthusiastic "send-off." It is interesting to note, in connection with this Lighting Service Bureau, that there are to-day, operating with great success in Europe and America, sixteen Lighting Service Bureaux operating for the improvement of lighting, and having all the weight of international collaboration in connection with research work. The South African Electric Lamp Association is a branch of the parent international body, and this Lighting Service Bureau will be run on exactly similar lines to those already established, while it is hoped that it will be possible to open other bureaux in all the large centres, such as Cape Town, Durban, etc.

Organization and Work of the Bureau.

The organization of the Bureau will be split up into several sections—the illuminating engineering section, which will deal with lighting fundamentals, scientific investigations, economics of light production, etc. The demonstration section, which will design demonstration equipment, give lectures and devise new methods of presenting the subject of lighting in a practical manner. The publicity section, which will deal with the preparation of booklets, press articles, etc., on all phases of electric lighting. The education section, which will be prepared to assist engineers and salesmen, electric supply authorities, contractors, manufacturers and wholesale distributors by special courses of lectures and demonstrations on the latest development in illuminating engineering. The Bureau will at all times be open to the general public, and it is anticipated that all classes of consumers will make full use of it.

Equipment of the Bureau.

The premises are very adequately fitted and equipped to deal with every phase of lighting. At one end of the main room are three domestic-lighting alcoves, showing alternative methods for dealing with the home. Shop-window lighting is dealt with at the opposite end of the room, while the ceiling is equipped with a wide range of fittings to cover general lighting for all classes of buildings. Street, flood and poster lighting and first principles and general theory are all provided for.

It is possible to seat about 150 people to listen to the lectures. As with other Lighting Service Bureaux, the Johannesburg organization will undertake lectures in various parts of the country, for which purpose special portable demonstration apparatus operated from secondary batteries has been prepared.

The engineer who is in charge of the Bureau is Mr. E. S. Evans, late of the E.L.M.A. Lighting Service Bureau staff, London. The extensive programme which has been prepared under his supervision suggests that the Bureau will have great influence on lighting progress in South Africa.

Domestic Illuminating Devices and Their Design

By OTTO HERBATSCHEK and H. KOCH (Vienna)

SUMMARY.—The degree to which the general principles of illuminating engineering can, and should, be applied to domestic lighting is discussed, followed by an investigation of the suitability of various materials now used for constructing fittings satisfying both technical and æsthetic requirements. Some typical examples of these fittings are illustrated and their properties discussed.

AMONGST the many applications of electric light, that of domestic illumination is worthy of special study. For most purposes the planning of a lighting installation follows certain generally accepted principles. Thus it is desirable to consider sufficient illumination, obviation of glare, correct shadow effect and small diversity factor, details which, owing to the construction and operation of the human eye, require special consideration in industry, where all unnecessary strain on personal energy must be reduced to a minimum. In designing the illumination of household premises, generally speaking, fixed rules cannot be rigidly followed. Furthermore, although economy can never be neglected, the actual cost, whether of the installation or its maintenance, need not be so rigidly restricted. Individual tastes and requirements should be studied. Besides securing the necessary degree of illumination, sufficient attention should be paid to æsthetic and architectural requirements, so as to achieve a mental harmony with the surroundings.

The rooms of a house may be classified, according to the purposes for which they are used, somewhat as follows:—

1. Those destined for a specific purpose, such as the kitchen, bathroom, reception room, etc.
2. Dwelling-rooms which serve a general purpose, as for instance the drawing-room, dining-room, library, study, bedroom, nursery, etc.

Fittings intended for rooms in the first category may usually be selected mainly for their illuminating qualities, simple designs being, as far as possible, adopted. The enclosing glassware should be such as to obviate glare, i.e., the source of light should be completely screened and the surface brightness should be low. Ample illumination should be provided, and light distribution should be even. In order to avoid disturbing shadows it may be necessary to add special local lights, supplementary to the otherwise ample general illumination of the particular room.

The most important requirement in the illumination of dwelling-rooms is the selection of materials to obviate glare; next to this follows the correct illuminating properties of the fittings, which should not only constitute efficient light source but should bear a proper relation to the surroundings so as to harmonize with the decorative scheme and the architectural features of the interior. The individual taste displayed in the decoration and character of the dwelling-rooms should likewise be emphasized by the embodiment in them of lighting fittings of appropriate design and material, even though their cost may approach the economic limit.

Suitable specific illumination attention may be ensured by the application of ordinary engineering data, but the addition of an "enlivening effect" requires, quite apart from the absolute necessity of avoiding glare, a tasteful, satisfactory and correct style of design of fitting. This design should harmonize, both by day and by night, with the appearance of the room, and to such a degree as to become apparently part of the actual decoration. The entire area of a dwelling-room should be provided with ample illumination, and its degree and distribution should be under control. Furthermore, the disposition of the light sources and the pattern of the fittings should enable certain areas in the room, such as a table surface, a comfortable reading corner, or a writing desk, to receive adequate local illumination. This local illumination, often compulsory in industrial installations, is particularly desirable in the home. There seems to be a natural human desire for such conditions, and mental concentration appears to be stimulated by a well-illuminated glare free surface surrounded by a relatively subdued area.

Conditions of illumination suited to conversational and recreative entertainment, rather than for actual work, are obtained by a less intensity and lower brilliancy, whilst in rooms where festivities take place a considerably higher illumination may be advisable in order to stimulate the joy of life and animate the spirits. Hence it is usually desirable in dwelling-rooms to aim at less regularity of illumination, provided always that it can be supplemented when required, so as to produce an evenly distributed light over all parts. This desideratum for domestic lighting is well achieved by reinforcing a general illumination derived from one or more central fittings by good local lighting obtained from floor or table standards. In this flexible manner one can deal with all possible requirements, whether they be for the creation of joyful feeling or the promotion of working activity.

The facility with which modern materials can be applied to the construction of technically desirable designs harmonizing correctly with the style of decoration enables entirely satisfactory results to be obtained. Such materials fall into two main groups, those associated with the distribution of light and those used in the structure of the fitting.

(A). Light-distributing Materials.

These include all parts of the fitting which in any way influence the distribution of the light emitted from the lamp filament or assist in the elimination of or protection from glare. The actual applicability of any material is dependent on its reflecting power, its permeability to light, and its thickness and shape.

1. *Incandescent Lamps.*

The electric incandescent lamp is doubtless the most valuable of all lumino-technical materials, as it can serve both as a light source and as a light directing and diffusing body, and can be made to comply, in shape and style, with almost any requirement.

Watt Consumption. Except for small fittings, such as ceiling bowls, brackets, table and floor standards, and subsidiary rooms in which specific local illuminaion is usually required, single lamps are rarely found in domestic lighting fittings. Even in those places where one lamp would serve the desired purpose, architectural features often call for a multiplicity of units, and, as previously mentioned, when the æsthetic result has to be considered the economy in current may be a secondary consideration. The higher efficiency derived from incandescent lamps of larger sizes is also a matter of minor importance, especially as distribution of light from many sources throughout a room ensures economy owing to the possibility of graduating the quantity of light to the immediate requirement. In other words, the actual watt consumption will rarely attain the maximum provided.

The lamps most commonly used consume 25, 40 and 60 watts; those of 75 and 100 watts are less often used for domestic work. In addition to the standard patterns used in general illumination, both the vacuum and the gasfilled lamp are made in various special forms. The cylindrical shapes, being so often used without any enclosure, are usually made either of frosted or opal glass, the latter material being increasingly used for lamps with the higher watt ratings. The most commonly used special shape is the frosted bulb, although the opal glass bulb is better suited for

gasfilled lamps. Imitation "candle" lamps, formerly much in demand, have almost disappeared, but a somewhat similar type, the single-pointed opal tube, has come into popularity. Unless the fitting demands the resemblance to an older form of illuminant, it is better practice to use tubular lamps with rounded ends. These hitherto have only been obtainable in frosted glass, but double-ended cylindrical (cornice-lighting) lamps are constructed in all customary sizes in opal glass, and consequently have been embodied in the most recent patterns of fittings.

2. *Illuminating Glassware.*

The development of domestic lighting has recently been characterized by the attention concentrated upon glass, almost to the exclusion of all other materials. There are various reasons for this, the chief being the influence of the illuminating engineer, who has expressed his full appreciation and approval of this tendency. The glass now utilized is selected almost entirely for its illuminating properties. Clear, mirror-crystal and ribbed glass are now obsolete, and ornamental glass is seldom used. Althought frosted glass has been adopted in numerous new designs, it has already passed its zenith, and semi-opaque or diffusing glass is finding increased appreciation.

(*a*) Frosted glass only obviates glare to a limited extent, and its use should be confined to lamps of small wattage and low brilliancy, such as those of the small vacuum pattern. Its technical value for illumination purposes is dependent on whether the roughening has been caused by sand-blast or acid etching and the thickness adopted. The properties usually requiring consideration are shown in Table I:—

TABLE I.

Properties of glass.	Frosted glass.	Opal glass.	Opal flashed glass.
Customary thickness:			
(*a*) mm.	... 1.5 to 2.5	1.5 to 4	1.6 to 4
(*b*) in.	... 0.06 to 0.1	0.06 to 0.16	0.06 to 0.16
	Per cent.	Per cent.	Per cent.
Reflection	... 5 to 15	40 to 70	30 to 50
Transmission	... 70 to 94	20 to 45	50 to 87
Absorption	... 3 to 15	5 to 30	3 to 15

Frosted glass is now mainly used for mirrors to secure extensive luminous surfaces, and in all places where a large number of light sources are to be united into one luminous unit, the glare being obviated by other means, such as screening by metal reflectors, etc., or the adoption of a mounting height such that glare effect is negligible. Frosted globes, cylinders, etc., are now seldom met with, as these shapes are now customarily made of semi-opaque glass. Where particular stress is laid upon the decorative appearance and it is undesirable the lamp filament should be visible, and especially where the appearance by daytime excludes the use of other varieties, frosted glass is still encountered.

(*b*) *Semi-opaque Glass.* Opal and opal-surfaced glasses, owing to their lumino-technical qualities, are obtaining an important position both for industrial and decorative lighting work. The various æsthetic and economic properties, and in particular the absence of glare, good diffusion, reflection, etc., have been ascertained from a large number of makes of this variety of material, and values are stated in Table I. The almost complete elimination of glare secured with semi-opaque glass when there is a suitable relation between the brightness of the filament and the area of the illuminated surface, together with the good diffusion obtained, makes this material eminently suitable for every variety of interior illumination.

In accordance with the stated requirements as regards glare and light absorption, sheets, spheres, shades, globes, etc., can be made either from opal or opal-flashed glass. The polished surface possessed by most semi-opaque glass (such as brilliant opal, pearl granite, pearlite, etc.) has often stood in the way of its adoption, but the recent introduction of frosted semi-opaque glass (such as Skotophane, Osirit, etc.) has overcome this detrimental quality. As the majority of opal and opal-flashed glasses possess a selective absorption, which causes the red portion of the spectrum to become prominent, it is therefore desirable that these materials should only be used with gasfilled lamps.

3. *Metals.*

Many metals, all having somewhat similar properties, have recently been used, both for their mechanical qualities and their illuminating qualities, in the domestic electric light fitting.

Although metallic reflectors for local illumination are far from new, their application to domestic purposes is somewhat novel and presents the advantage that the reflector material is identical with the structural material.

The prevailing metals are brass, the yellow bronzes, nickel (usually only as plating), the aluminium bronzes and other similar materials. Domestic reflector fittings of ceramic, or paint, enamelled sheet metal may be left out of consideration, as these belong to the category of specific lighting devices. The nature of the reflection surface attained depends upon the treatment the metal has undergone; surfaces, with the exception of those of aluminium bronze, are usually highly polished. The reflecting value may be taken from Table II, in which the data of the absorption assumes an approximate wavelength of 550$\mu\mu$.

TABLE II.

Material of surface. Per cent.	Brass. Polished.	Brass. Matt.	Nickel. Polished.	Nickel. Matt.	Aluminium. Polished.	Aluminium. Matt.
Reflection ...	61–62	52–55	53–55	48–52	67–70	55–65
Absorption ...	38–39	45–58	45–47	48–52	30–33	40–45

Metallic reflectors are mainly used for dispersive illumination over large areas. The selective reflection of metallic reflectors is a valuable feature that can be made use of in metal fittings. The general form in which metallic fittings are constructed is fundamentally geometric, and is, basically, either the complete or the truncated cone; these forms present illuminating features only closely approached by the hemisphere.

4. *Textile Materials.*

(*a*) Woven silky materials (such as pongis, battiste, etamine, etc.), which until recently were in extensive use for indoor illumination, have almost disappeared, and are now used for delicate "effect" lighting where subdued illumination is desirable. They have been replaced by glassware overlaid by small paper and cardboard shades. This elimination of woven silky materials has resulted from a desire to follow æsthetic and architectural requirements, and meets with the approval of the illuminating engineer. The advantages secured by the ample diffusion, permeability and high reflecting power attainable by suitably constructed lined shades are exhibited in Table III. However, the disadvantage of low luminous efficiency, as well as the difficulties of cleaning, must be remembered. A soiled and dusty material soon loses its technical value. Modern textile shades are, almost exclusivly, of a simple geometrical form, such as a ball, a cone and a cylinder, contrived for easy removal and cleaning.

TABLE III.

	Reflection Per cent. Unlined.	Reflection Per cent. Lined.*	Transmission Per cent. Unlined.	Transmission Per cent. Lined.*	Absorption. Per cent Unlined.	Absorption. Per cent Lined.*
Crêpe de chine...	35.0	—	64.0	—	1.0	—
Silks:—						
White	35.7	—	59.6	—	5.4	—
Yellow ...	16.7	40.9	52.5	30.6	30.8	28.5
Bright red ...	16.8	39.6	45.6	27.3	37.6	33.7
Bright green ...	23.6	42.6	33.1	23.2	43.3	34.2

* Lined with white silk.

(b) Pulp-made materials, such as impregnated papers, pasteboard, cardboard, etc., possess the advantage of being easily cleaned, and are therefore often of considerable value for effects similar to those which were hitherto only obtainable by the use of silky textiles. They can also be applied where illuminating glass is undesirable owing to danger of breakage, etc. The diffusing capacity is somewhat less than the materials mentioned

in (3) above; in the ordinary thicknesses they are less translucent than these, their reflective power depends on the manner in which the surface has been treated. The following data may be of interest:—

Material.	Coloured Parchmentized Card.
Thickness, mm.	0.75 to 1.0
,, in.	0.03 to 0.04
Reflection, per cent.	55 to 60
Transmission, per cent. ...	25 to 30
Absorption, per cent.	10 to 20

Parchmentized or specially prepared cardboard shades of a simple geometrical form, with the exception of the low-priced folded shades, are appropriate to the majority of the best designs of fittings.

5. *Other Materials.*

(*a*) The utilization of thin slabs of natural stones, such as marble, alabaster and similar materials, has greatly diminished, but is still found in cases where good diffusion is needed and moderately brilliant colour is required for some particular effect.

(*b*) The most important of the artificial materials is "Cellon," which is obtainable either clear or mottled, and in the latter finish has similar illuminating properties to those of opal-flashed glass, with the advantage that it is unbreakable, bendable and easily manipulated. Being obtainable in all colours and with various patterning, it appears to occupy an intermediate position between vitreous and pulp materials; in addition to the good qualities of both, it has the merit of of being practically non-inflammable. This material has now entered the field of domestic lighting, and threatens to replace many other materials. A semi-elastic glassy material possessing the properties of glass combined with those of silk, known in Vienna by the name of "Parivienna," is made by covering the previously painted, or impregnated, silk or similar material shade with a glass dust, which is then melted by a high

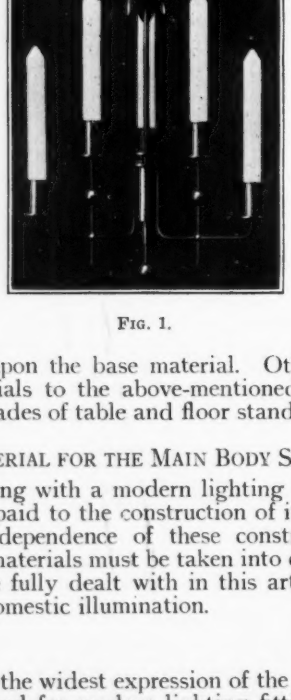


FIG. 1.

temperature upon the base material. Other somewhat similar materials to the above-mentioned now replace silk for the shades of table and floor standards.

(B). MATERIAL FOR THE MAIN BODY STRUCTURE.

When dealing with a modern lighting fitting, attention must be paid to the construction of its main body. The mutual dependence of these constructional and illuminating materials must be taken into consideration, but cannot be fully dealt with in this article, which is confined to domestic illumination.

1. *Metals.*

Bronzes, in the widest expression of the word, are the most in demand for modern lighting fittings. Of this series brass is the most used, usually retained in its natural colour and highly polished, or else coated with nickel. A definitely lighter, as well as more easily shaped material is yellow bronze, with a 70 per cent. copper content, as compared with with the 60 per cent. in ordinary brass. This is often met with in the better varieties of illuminating devices in its natural colour, highly polished and rarely nickel-plated. Where the golden yellow colour of these alloys renders them unsuitable, and, where nickel finish is not desirable, aluminium brass with an approximately matt finish is found. This, although giving a somewhat cold impression, must nevertheless be considered as indicative of the latest trend in fittings design.

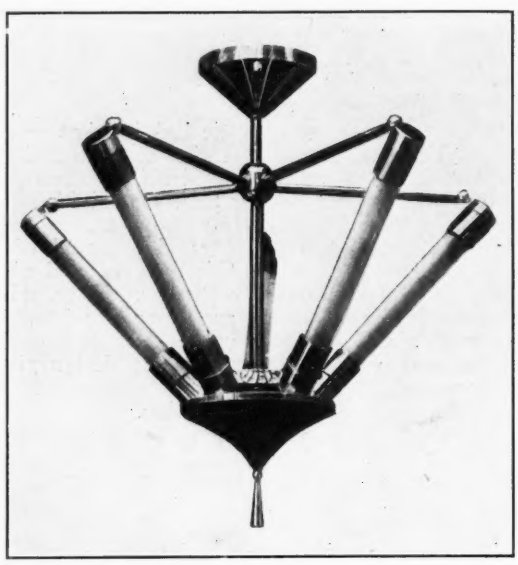


FIG. 2.

Antique bronzing is now less seen owing to the tendency in fitting construction to retain their natural colours of materials. New methods of treating metal surfaces, e.g., enlivening smooth surfaces by brilliant colours, have, however, been introduced.

The use of iron for high quality lighting fittings has almost ceased. Iron castings are never used, but wrought iron is occasionally embodied in very special designs.

2. *Other Materials.*

Of notably less importance are other substances, such as wood, the Jugo-Slavonic lime and stone-pine and the Canadian beech and oak being advisedly used. Although the individual relation to the design is largely submerged, centre-pendant corona and floor or table standards of quite modern design are often to be seen. Ceramic materials are customarily used in block or solid form to produce very tasteful table standards of unique appearance, but seldom for other purposes. Liability to fracture and relatively high price stand in the way of a larger development of china or earthenware amongst fitting makers, and they will probably be less used in the future than at present.

Moulded insulated materials in the form of table and pedestal lamps have also come into vogue. The absolute protection against shock secured in such fittings is of value when one takes into consideration how often and easily the body of a metal fitting can become "live" owing to wearing of the flexible conductor, a badly built-in switch, or other contingency. Attention should be also paid to the supporting cords and down rods of pendant fittings. These ought to harmonize both in colour, material and finish with the surroundings.

4. *The Design of the Fitting.*

The selection of the materials and the proper correlation of them in harmony with the place of use is essentially the province of the artist.

4. *Shape of the Luminous Body Carrier.*

Material must be chosen suitable for the function it has to fulfil, as well as in harmony with the surroundings, to produce in the fitting the desired shape. This also is the work of the artist. The artist obviously should be familiar with what is required from the light-

producing source and the nature of the distribution desired. His co-operation with the illuminating engineer is very desirable. Such mutual help may be compared with the practice, in earlier times, for the architect and the builder to work hand in hand, so that the completed building should be one which included the best possibilities of the constructional art. Only in this way will a finished fitting be achieved, which, in addition to appropriate appearance, complies with the requirements of illuminating technique.

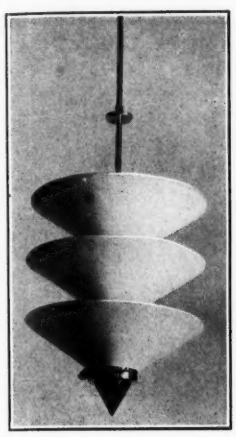


FIG. 3.

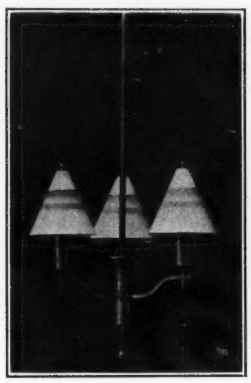


FIG. 4.

The requirements for a suitable domestic installation were dealt with in the commencement of this article, but before discussing actual fittings it may be well to say a word or two upon the æsthetic requirements. Although these are mostly purely of a subjective nature, and relate principally to the shapes given to the luminous body, they are yet controlled by certain basic principles which result from the accomplished effect, and fully illustrate the objective suitability they must possess. It may be said that modern illuminating fittings must strictly harmonize with the general decoration of the room; they should be of neat design both as regards material and in the adoption of definite outlines for specific purposes, resulting in a simple but appropriate form. The fundamental shapes, such as the ring, the crown, the chain-hung lamp, the cone, etc., seem permanent designs, although many other solutions of the problem have been seen owing to the desire to introduce innovations. Whatever the practice be in this respect, modern lighting fittings must show good taste, and especially a combination of lumino-technical materials in the main structure assembled in such a manner as to constitute a harmonious entity. Hitherto, the shades, globes and glass details were more in the nature of ingredients in the illuminating devices, and could not be considered organically necessary in the construction of a fitting. They were introduced in an entirely purposeless manner. The modern lighting fitting is, however, characterized by the fact that the lumino-technical material is prominently brought into useful service, although present in an obtrusive manner, and typical products made by Vienna firms show compliance with these views.

The new form of incandescent lamp has, in Fig. 1, been taken advantage of and emphasized by reducing the metallic parts to an absolute minimum while producing an original design. Glare is almost entirely obviated, although the surface brightness of the six opal tubes is intentionally maintained as great as feasible, the fitting being intended for general illumination of small reception rooms, for which purpose it may be regarded as entirely satisfactory.

Designed to secure from a single fitting both ample distribution throughout a room as well as good intensity on the working plane, the fitting shown in Fig. 2 consists of five opal tubular lamps at an angle to the horizontal, thus securing a suitably large volume of downwardly directed light, and an illumination free from glare with a notably good general diffusion of light that is variable in quantity in accordance with the dimensions of the fitting itself. The shadows thrown towards the ceiling are toned down, and almost obviated by the diffused light, those which remain producing an ornamental enlivening pattern. The metal parts, reduced also in this fitting to a minimum, are made to accord with the glassware, and thus it ranks as a good example of the fusion of correct illuminating features into the actual structure.

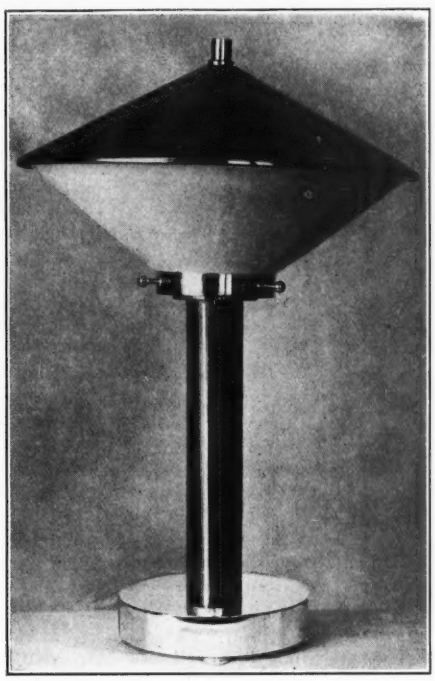


FIG. 5.

Semi-direct illumination is well attained by the fitting Fig. 3, in which the illuminating surfaces are so prominent that the constructional and artistic parts are inconspicuous. The three opal glass shades direct a luminous flux almost entirely towards the ceiling, while the light from the two lower sections is, by reflection from the under surface of the upper two, spread around the room with entire absence of glare. The soft, almost shadow-free, light diffused on the ceiling appears to be increased by this circumferential illumination. The suspended shades, apparently loosely hung, produce, both by daylight and when the fitting is in use, a distinctly agreeable impression.

The fitting shown in Fig. 4 is intended for a small reception room; it also disperses semi-indirect light, but in this instance highly coloured cardboard shades form a prominent feature. Here again a minimum of metallic parts is assembled in a very simple form with clearly defined lines.

A table lamp utilizing a metallic shade for downward reflection is exhibited in Fig. 5. Protection against glare is secured by an intermediate reflector, screening the opal-glass cone, but in spite of this it must often happen that the surface brightness of this cone is greater than that of the working area, and therefore the eyes might occasionally be fatigued; consequently this table standard has not a universal application, and should be placed out of the field of direct vision of the worker.

The foregoing general discussion and the few illustrated models cover but a small section of the territory of modern domestic illumination. Nevertheless, they may serve to show that it is possible to make fittings to comply with the scientific principles on which illuminating engineering is based, as well as with the æsthetic requirements of a home, in an eminently satisfactory manner. It may also be said that the pictures give evidence of excellent taste and good technical knowledge in the Viennese illuminating industry.

The Modern Arc Lamp Carbon

(By an Engineering Correspondent.)

THE research work of Hertha Ayrton on "The Electric Arc" covered so thoroughly most of the phenomena present when carbon electrodes are used for light production that many considered the research was completed, but the introduction in the earlier part of this century of the impregnated or "flame" carbon proved this to be by no means the case.

The intermixture, either in the body of the carbon or in a core surrounded by a pure carbon shell, of oxides and fluorides of a series of metallic elements improved the light emission and varied the physical properties of the arc.

The flame carbon with much incombustible and adherent deposit, rapid linear consumption, and response to a heat-storing "economizer" brought with it many problems in arc lamp construction that have only within the last years been solved by the perfecting of an enclosed flame arc lamp able to burn for about 150 hours with a single pair of carbons. A new complexion has thus been given to the question of ample and economic illumination of streets, open spaces and parks, which has revived the subject of increased light emission with minimum heat generation—a problem of importance in the film production and utilization industries.

Improvement has not been made solely in the effective illumination and burning period of the carbon arc lamp: its optical and spectroscopic properties have been revised owing to the demand for projectors for searchlights, film studios and kinematographic, therapeutic and photo-reproduction purposes.

Whilst the gasfilled lamp has been developed in efficiency, magnitude and applicability, the demand for arc lamps embodying high specific brilliancy of the light source, definite but constant variety of spectrum, absence of excessive radiant heat, and other properties apparently exclusively obtainable in the carbon arc, has become noteworthy. However perfect the arc lamp may be, however suitable its housing or however correct the optical arrangements utilized, it would be impossible to secure the reliable results demanded were carbons of the right mechanical and chemical make not available. Behind the apparently simple black, or copper-coated, rod are many interesting processes and much study, which secure consistent properties like steady burning, absence of hissing, definite coloration, low resistance, accurate diameter, even pairing, etc., that are now demanded by discriminating users.

A specializing factory exclusively devoted to the manufacture of arc-light carbons has recently been established in this country by The Ship Carbon Co. of Great Britain Ltd., at Chadwell Heath, and which had the advantage of building up its processes on the extensive experience, gathered during many decades, by the well-known Austrian "Ship" factory. Improved technique in machine processes, testing and research have here been brought into being and coordinated by Mr. Charles H. Champion, who was one of those who pioneered the "Excello" flame arc lamp in many parts of the world and has devoted recent years to the projection arc lamp carbon.

The fundamental material is obviously carbon, but this apparently simple substance is as difficult to secure

FIG. 2.—Mixing Plant.

isolated from detrimental admixtures as the rarest of the elements, consequently an extensive plant capable of depositing seven tons per week of this material, from the combustion of selected oils, in an atmosphere with a restricted oxygen supply, is the initial process. This soot, together with other carboniferous matter, undergoes a preliminary mixing and grinding in the heavy mills shown in Fig. 1, and is subjected to high pressure, forming it into stout cylinders about a foot long and six inches diameter, which are then calcined. The mass in these so-called cartridges is then ground a second time, the pulverized material being screened, graded and separated in accordance with its eventual integration to form one of the many varieties of carbon needed for either rod or shell. The grade selected is now finally mixed with definite quantities of specified chemicals and calorified in the special mixers shown in Fig. 2. The output, while still warm, is compressed again into cartridges, thus securing intimate combination, evenness of structure and absence of any striation in the final product.

When required for conversion into rods these cartridges are again heated and inserted in the extruding presses shown in Fig. 3. The highly compressed plastic material flows out from the nozzle either as a continuous rod or, if a mandrel is placed within, as a tube gliding along a flat metal plate automatically separated into regular lengths which are rolled off to one side of the receiving tray and there permitted to cool and stiffen. Systematically selected for straightness and absence of visible defects, such as striation or pitting, the product is now assembled in a cylindrical bundle, of a diameter appropriate for the next process,

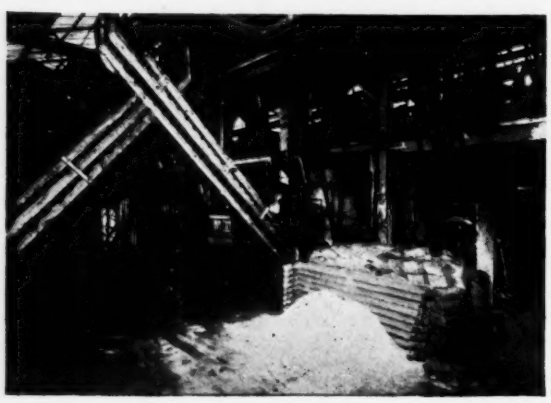


FIG. 1.—Grinding Mills.

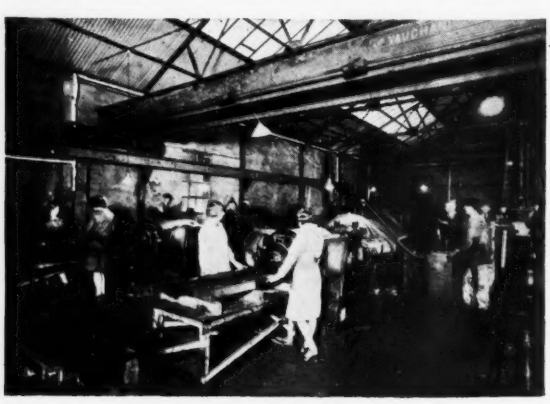


FIG. 3.—Press Shop.

wrapped with impregnated paper and inserted into the seggers or casings of refractory material. The seggers filled with the bundles, loose carbon grindings and ceramic grit are sealed airtight, and placed in one of the series of 18 ovens in the manner shown in Fig. 4.

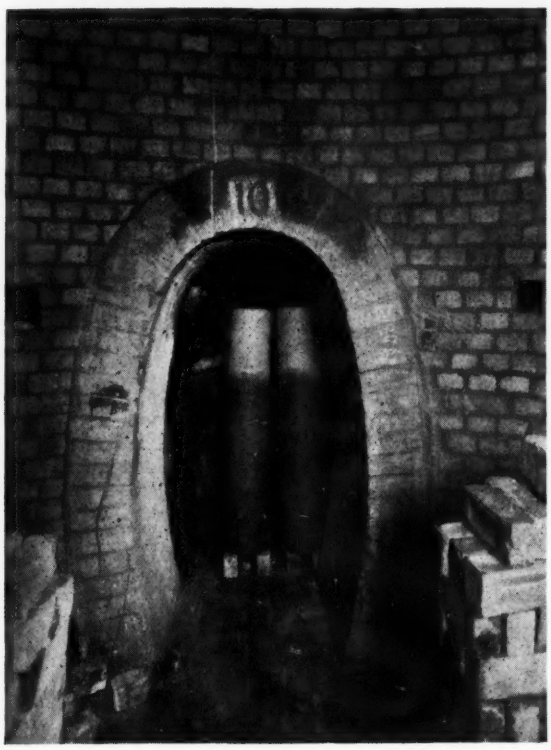


FIG. 4.—One of the 18 Ovens.

The series of ovens constituting the kiln shown in Fig. 5 is heated by producer gas and designed so that by the placing of the unions fitted with lifting eyes, shown in the background, the course of the hot gases can be controlled and directed to heat any of the several ovens in use, to secure any rate of thermal increment up to the maximum temperature requisite. The operation of the

FIG. 5.—Oven House.

kiln is pursued with meticulous care, as upon it much of the value and most of the cost of the product depends. The temperatures are observed by optical radiation pyrometers, thermo-electric couples, and recorded on a thermograph as seen on the nearest oven. Segger cones, placed near a peephole, provide confirmation of the actual temperature of the seggers. The hydrostatic pressure of the oven gases is also observed, so that all the local conditions are known.

After the oven has remained at the maximum temperature of about 1,400° C. for about 24 hours, the primary heat flow is diverted to the next succeeding oven, which has by then reached about 900°, and the first oven is allowed to gradually cool until its entrance can be unbricked, the seggers removed and the carbons taken out. The ends of the carbons are cleaned, an air blast being used to clear the core holes in the shells, and the product is again examined for straightness, then cut to length, pointed, and smooth-ended by the machines seen in Fig. 6, and now only needs the finishing processes.

FIG. 6.—Finishing Shop.

Ordinary carbons have their surfaces polished by automatic buffing machines, but the high-intensity positive carbons are ground absolutely true and of micrometrically correct diameter by machines, seen in Fig. 7, specifically designed for the purpose.

Some of the solid cores as well as the negatives used in high intensity lamps are copper-plated to secure maximum electrical conductivity, the effective reduction in ohmic resistance being ascertained by a "drop" test applied to each carbon.

The inserted core which plays so important a role in modern carbons is either a solid rod or plastic material, and for high intensity negatives is copper sheathed before insertion in order to eliminate the risk of molten copper globules falling on the mirror of the projection lantern. Plastic cores hitherto inserted by a hand-operated press are now being forced into the shells by automatic machinery, thus ensuring greater regularity of texture as well as lower cost. The other factory processes are largely routine, such as marking and packing.

Parallel with the whole series of operations above detailed is the inspection, testing and research in the factory, as well as in the specially equipped chemical and lumino-technical laboratory, through which specimens of all raw and finished material passes. Raw material is tested to ascertain its purity and suitability, finished carbons to make sure of the luminosity, slow rate of consumption, freedom from burning troubles, and that the correct spectrum is secured, also to determine what competitors in other parts of the world are supplying. To enable these tests of effective working to have real value the laboratory is provided with recent pattern arc lamps and projectors of all the best known makes.

One of the most important tests of the finished carbons is their effective screen illumination for cinema work; consequently for measuring this under practical con-

FIG. 7.—Finishing Shop.

ditions the section of the laboratory shown in Fig. 8 has been arranged. The view shows various projectors in position, the beams from which are projected through apertures under the instrument board on a screen. To the left are the panels connected to the generators, near the projectors are the resistance regulators and above them the lamp-circuit ammeters and arc-pressure voltmeters.

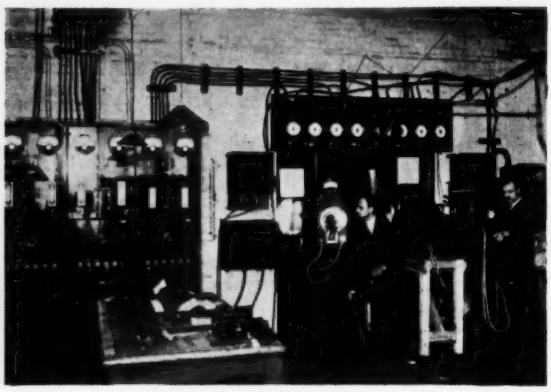


FIG. 8.—Central Panel in Electrical Testing Laboratory.

We were privileged to participate in some tests of carbons and projectors and give the results below, the British-made carbons being those produced in these works, the others the best known foreign makes.

Measured illumination obtained from different pattern rotating carbon film projection arc lamps of most recent construction, burning various makes of high intensity carbons. Screen of fine matt white coating on plaster background at 37 ft. from the "gate." Picture surface 6 ft. high, 8 ft. wide.

(*a*) *Hall and Connolly Rotating Carbon Projection Arc Lamp.* Positive carbon 13.6 mm. diameter. Negative 11 mm. diameter.

Make of carbons		British	American	Continental
Amperes	Arc volts	Foot-candles on screen		
100	57	55	50	55
110	57	85	70	70
120	58	110	100	95
130	59	130	125	115
140	59	170	190*	150‡
150	62	220	†	170§

Linear carbon consumption when burning at the maximum rated current	British	American	Continental
	Ins. per hour		
Positive	10½	15	12–13
Negative	2	2½	2½

Notes.—The carbons were all rated for 130 amperes maximum current.

* The carbons with this current commenced throwing off minute particles of unburnt matter and the positive core started intermittent blowing, causing irregularity in the constancy of the illumination.

† The blowing of the cores was so constant that the arc was extinguished at very short intervals, making light measurements impossible.

‡ The arc had become irregular owing to blowing and the size of the crater had commenced to diminish.

§ The inconstancy of the arc became inconveniently noticeable and the size of crater had further diminished owing to spindling.

The temperature at the gate was about 320° C.

(*b*) *Peerless Automatic Mirror Reflector Rotating Carbon Arc Lamp.* Positive carbon 9 mm. diameter. Negative carbon 8 mm. diameter.

Make of carbons		British	American
Amperes	Arc volts	Foot-candles on screen	
50	49	75	45
55	50	95	70
60	50	110	100
65	52	150	110
70	54	180	140
75	60	230	170*
80	60	250	200†

Linear carbon consumption when burning at the maximum rated current	British	American
	Ins. per hour	
Positive	9½	9½
Negative	3	3½

Notes.—The carbons were all rated for 70 amperes maximum current.

* Irregularity of illumination and sooting had commenced.

† The irregularity and sooting had become most pronounced and reduction in crater diameter was apparent.

The temperature at the gate was somewhat in excess of 540° C.

(*c*) *Ross Mirror Reflector (Stationary Carbon) H.I. Arc Lamp.* Positive Carbon 13.6 mm. diameter. Negative 9 mm. diameter.

On this pattern arc a slightly different series of tests were conducted, in view of the—

(*a*) Stationary Carbons.
(*b*) Hand feed.
(*c*) Relatively low arc volts at which this type of lamp must be run, i.e., 30-32 volts across the carbons.

To obtain the best comparative results, the arc was in each instance fed to its predetermined voltage, at various currents, and then left without adjustment for a given period and the differences in screen illumination measured.

The following results were obtained:—

	Amperes	Feeding Point	15	30	45	60	75	90
				Intervals in seconds.				
				Foot-candles on screen.				
Continental	100	140	110	100	100	60	40	30
	85	90	90	75	65	55	45	45
	70	65	60	45	35	30	25	20
British	100	65	50	50	40	35	30	20
	85	60	55	45	45	40	40	40
	70	60	50	45	20	20	20	20

The temperature at the gate was in excess of 500° C.

It will be noticed that when the current density is reduced, which in effect is underrunning the high intensity carbons, the British carbon even then shows slight advantage, but at the correct and higher densities a marked superiority was obtained.

The measurements were all made on the same instruments, a Holophane Lumeter being used for determining the illumination, consequently the results are strictly comparable.

These observed measurements refer, it will be noted, to only high intensity pattern arc lamps used for projection work, a field in which a variety of lamps still holds sway. Turning to other patterns of lamps it was noted in the Company's laboratories that some "Dia" enclosed flame arc lamps were being practically tested to ascertain if the average of 150 burning hours per trim could be extended without diminution of the light emitted. As these lamps give out light at the rate of one mean hemispherical candle-power for 0.33 watt they present a formidable competition even to pressure gas for public lighting, and consequently any improvement in operation is of critical importance to their makers.

That an important aid is given to the arc lamp maker and user by the establishment of this factory with its well-equipped and practical research department is clearly evident from the foregoing as well as from the nature of the enquiries received by it for special carbons for specific purposes.

Institution of Welding Engineers

PRIZE OF £10. 10. 0. AND GOLD MEDAL.

An enterprising departure is being made by the Institution of Welding Engineers, which is offering a gold medal and a prize of £10 10 0 for the best paper bearing the title "Welding Practice and Methods based on my own Experience." The paper must be undertaken by a *bona-fide* operative welder and, as the title suggests, must be based on the author's own practical experience. Entries must be received by the Institution not later than August 31st, 1930. Further details of the conditions of the competition may be obtained on application to the Secretary of the Institution of Welding Engineers, 30, Red Lion Square, London, W.C.1.

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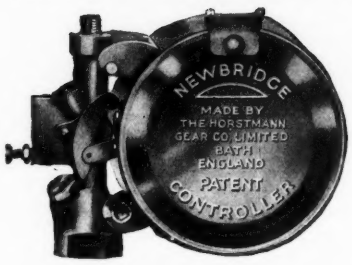

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Presentation Dinner to Mr. J. W. Elliott

The Directors and Management of the Edison Swan Electric Co. Ltd., met on the 23rd of May at the Piccadilly Hotel to pay tribute to Mr. J. W. Elliott, who is retiring after 44 years' service with the Company. The Chairman of the Company, Mr. Charles F. Spencer, who presided, referred in proposing the toast of the guest of honour to the amazing electrical developments which have taken place since Mr. Elliott joined the Company in 1886, and predicted the solution of the unemployment problems of the world by the more extensive use of electrical power in industry. A time would come, he said, when the 47-hour working week would through the medium of electricity become the memory of an unenlightened age. Mr. Elliott, he averred, would, in his retirement, take with him the good wishes of a great many friends in the electrical industry. Speeches supporting this toast were given by Mr. E. A. Gimmingham, Mr. C. H. Cox and Mr. F. V. Hasemore. On behalf of the Directors and Management, the Chairman then presented Mr. Elliott with a silver tea and coffee service, and a handbag for Mrs. Elliott, as a souvenir of the occasion. In his reply Mr. Elliott sketched the development of the electric lamp and valve industries, and expressed his regret at severing the many excellent friendships he had formed both amongst the members of the staff and amongst the trade. It will be remembered that Mr. Elliott was one of the prime movers in the formation of E.L.M.A. and he has been on many occasions chairman of the Sales Committee. His knowledge of the electric lamp industry is that of a pioneer, his experience commencing when Sir Joseph Swan started the first factory equipped to produce electric lamps on a commercial basis. Mr. Elliott has also been chairman of the B.V.R.M.A. on several occasions.

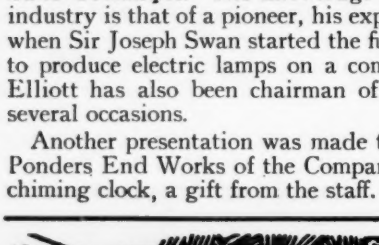
Another presentation was made to Mr. Elliott at the Ponders End Works of the Company in the shape of a chiming clock, a gift from the staff.

Holophane International Conference

An interesting event during July 7th and 8th will be the International Conference arranged by Holophane Ltd. at their showrooms and laboratories at Elverton Street, Westminster. Similar conferences have been arranged in previous years, but the forthcoming conference will be a somewhat special one. Visitors from 24 different countries are expected. Amongst those who are expected to attend are Dr. J. W. T. Walsh (President of the Illuminating Engineering Society), Professor Dr. J. Teichmüller (Director of the Lichttechnisches Institut, Karlsruhe), Mr. Gray Wornum (President of the Architectural Association), Mr. Howard Robertson, F.R.I.B.A., and Mr. J. S. Dow (Hon. Secretary of the Illuminating Engineering Society). We also understand that Mr. A. P. Trotter, who has been aptly termed " the father of illuminating engineering " in this country, will attend the dinner that is being held in connection with the conference; in view of his early pioneering work on prismatic glassware his presence on this occasion will be specially welcome.

A Panel of Expert Translators

International conferences are now a familiar feature of most fields of scientific and technical work, and the need for expert translators is being increasingly felt. A timely step has thus been taken by the Association of Special Libraries and Information Bureaux in preparing a panel of expert translators. A representative committee has been formed to prepare a scheme for establishing this panel of translators, who should have both linguistic and technical qualifications. The Association will thus act as a link between the translator and the user. Names of qualified translators are now being registered. Those interested are invited to get in touch with the Secretary of the Association of Special Libraries and Information Bureaux, 26, Bedford Square, London, W.C.1.



REVIEWS OF BOOKS AND PUBLICATIONS RECEIVED

ELECTRICAL WIRING AND CONTRACTING. *Edited by H. Marryat M.I.E.E., M.I.Mech.E.* (*Sir Isaac Pitman & Sons Ltd.* (1930) *London*, 1930; *pp.* 1,808, *in seven volumes*).

The ever growing ramifications of electrical engineering have caused handbooks on the subject to expand continuously, and it is now only possible to deal with special aspects in the briefest way in a single volume. This comprehensive work, under the editorship of Mr. Marryat, has been appearing in parts. The complete seven volumes is now available. Each section is by an expert. It is impossible to do more than give an indication of the contents of the entire series of volumes, but it may be mentioned that the main titles are as follows: Workshop science, drawing, electricity and magnetism, alternating current work, D.C. generators and motors, mathematics, A.C. generators and motors, measuring instruments and testing, wires and cables, practical wiring, switching, primary and secondary cells, motor starters and regulators, private power plant, electric signs, estimating, heating and cooking, converting plant, electric bell alarm and clock systems, electric lifts, lamps and illumination, house and office telephones, radio installation work, industrial wiring work. The names of those responsible for many of the sections will be familiar. The section of chief interest to our readers (lamps and illumination) is dealt with by Mr. J. S. Dow, and contains a considerable amount of condensed information and numerous effective illustrations. The writing throughout the series of volumes appears to have been done with considerable care, the explanations are easy to follow, and the illustrating has been well done. The series has been arranged to follow the scope of the City Guilds Syllabus; it affords something much beyond a textbook for examinations and should be of considerable value to many teachers as well as engineers.

PLUMBING AND GASFITTING. *Edited by Percy Manser, R.P., A.R.S.I.* (*Sir Isaac Pitman & Sons Ltd.*, 1930; *pp. issued in seven volumes*).

This series of volumes is complementary to that dealt with above. At the moment of writing only five of the seven volumes are to hand. The sections at present covered are as follows: Materials, industrial uses of gas, physics, gas distribution, chemistry, gas meters, gas lighting, drainage and drainage fittings, workshop arithmetic and calculations, joining and fixing pipes, service laying, gas pressures and discharges, geometry, measurement and estimating, domestic hot water supply, pipes and pipe bending, heating and cooking.

THE EMPIRE MUNICIPAL YEAR BOOK, 1930-31. (*The Sanitary Publishing Co. Ltd., London*, 1930; *pp.* 332).

This is the 48th year of publication of this familiar year book, which has established a field of its own. A foreword by Professor E. G. H. Clements emphasizes the many problems arising in connection with our vast network of public highways. There is a useful survey of progress in street lighting during 1929, in which allusion is made to the British standard specification for street lighting, the annual conference of the Association of Public Lighting Engineers, and the proposal, recently revived, that a joint authority should be established to deal with public lighting throughout the country. There is a contribution on gas lighting by Mr. (now Sir Francis) Goodenough, and there are numerous special articles on subjects of interest to municipal experts and surveyors. The handbook also contains the familiar statistical data giving particulars of local authorities and their officers.

TRADE NOTES & ANNOUNCEMENTS

FLOODLIGHTING AT THE I.M.E.A. CONVENTION, EASTBOURNE.

Mazda lamps contributed very greatly to the brilliance of this year's I.M.E.A. Convention at Eastbourne. The Grand Hotel, where the delegates stayed, was bathed from end to end in coloured light, provided by high-wattage Mazda lamps in special projectors placed at various points in the grounds of the hotel. The façade of the Grand Hotel is enormously long, and the effect at night, in contrast with the comparative darkness of the rest of the sea front, was highly impressive. No doubt the delegates at the Convention were duly grateful for this most instructive and beautiful floodlighting. One member who had attended the Convention as a matter of business, rather than of pleasure, was heard to murmur, "Duty enriched by light."

Such displays add greatly to the interest of conventions. They are appreciated by visitors and they afford to the people of the city an opportunity of judging the possibilities of floodlighting in rendering it attractive by night.

A view of the Grand Hotel, Eastbourne, floodlighted by High-wattage Mazda Lamps in special Projectors.

THE LIGHTING OF BRIGHTON AQUARIUM.

Brighton Aquarium was opened to the public as far back as 1872, and still ranks as the largest and most famous aquarium in the world. Under the supervision of Mr. Geo. H. Weller, F.Z.S., A.R.P.S., the Manager, and the electrical staff, the lighting has recently been remodelled, and now furnishes a good example of modern decorative treatment. A feature of interest is the series of 43 massive columns of bronze, surmounted by hexagonal panelled lanterns of distinctive design.

In the tank-corridor the main lighting is by means of 12 in. diameter hexagonal panelled pendants, with tinted seaweed-design glassware. The entrance from the terrace (Madeira Drive) is illuminated by 20 ceiling fittings, also of hexagonal design. There are two well-appointed restaurants; the principal one lighted by eight 32-in. modern style fan-designed panels, and bracket units on walls and columns; the smaller restaurant by 18-in. square panelled fittings, with wall brackets

FIG. 1.—The Main Entrance to the Brighton Aquarium. One of the special lighting standards referred to figures on the extreme right.

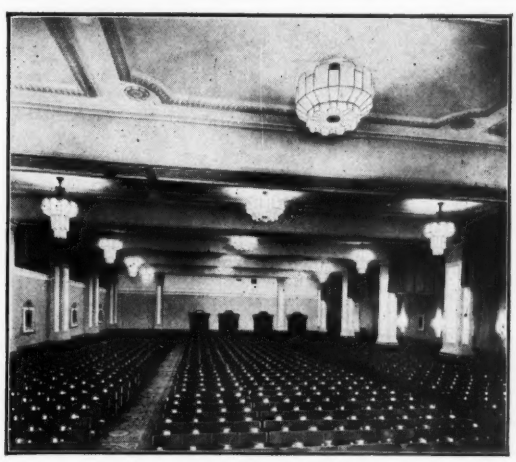


FIG. 2.—The Public Hall with its imposing panelled glass fittings.

These are mounted on the stone balustrade, as shown in Fig. 1. Lanterns of similar design are mounted in wall brackets at the main court entrance. The public hall (Fig. 2) is illuminated by five 4½-ft. corona fittings arranged in the centre, with ten smaller units, each 3 ft. in diameter, ranged along the sides. Supplementary illumination is furnished by wall brackets and portico lighting by lanterns of the type described above.

to match. Finally, mention should be made of the special stage-lighting equipment provided for the stage of the Public Hall mentioned above. All of these units are of special G.E.C. design and manufacture, and Osram lamps are used throughout the building. There can be no doubt that in all such cases good lighting is a sound investment, attracting many visitors who might otherwise pass the building by.

"LACENT" FITTINGS

A leaflet issued by Messrs. Heyes & Co. Ltd. introduces the "Lacent" fitting, described as a new member of the "Wigan" Fittings family, closely related to the familiar "Wigan" prismatic bulkhead fitting. The compact nature of the fitting will be understood from the accompanying illustration, and it is specially suitable for corridors, subways and staircases or for ceiling lighting. It should be very useful in hotels, flats, ships, hospitals, etc., where good appearance united to neatness is desired. The depth of the fitting is only 4½ ins. The fitting is designed for a 60-watt pearl lamp, but it will take the 60-watt M.F. type as well. The lamp projects into the ribbed glass moulding and a convenient distribution of light is obtained, the effect being specially soft and free from glare when pearl lamps are used.

MESSRS. CHANCE BROS. & CO. LTD.

A CORRECTION

We regret that through an oversight the two illustrations at the foot of the advertisement of Messrs. Chance Bros. & Co. Ltd., which appeared on page xi. in our last issue, were reproduced to the same size. The intention of the advertisement was that the 8⅛ diameter diffusing roundel shown on the right should appear to the right scale in comparison with the 12 in. by 6 in. F.L. Condenser Lens. It will be recalled that in a note published in our last issue (page 158) it was mentioned that the maximum intensity obtained from the 12 in. lens is about 40 per cent. greater than that given by the 8⅛ diffusing roundel. The increased size of the former thus results in a substantial improvement in the utility of the signal.

A NEW PHILIPS FITTING

Philips Lamps Ltd., of 145, Charing Cross Road, have introduced a new commercial diffusing unit (Type D.I.35) which is of original design and incorporates several improvements in fixing methods. No screws or fixing points are necessary. The shade carrier has been replaced by a plate bearing the globe. A parabolic-shaped plate covers this and enhances the globular appearance of the fitting. No adjusting device for the lamp is necessary. The normal lamp used is of 200 watts, but the fitting is designed to take lamps of from 150-500 watts inclusive. The finish is nickel plate on copper and the globe is made of Philips three-ply Phililite glass, Type D.I.L.35.

This fitting, which is shown in the accompanying illustration, is supplied in only one size—suspension 20 in., globe diameter 14 in. Edison screw lampholders are fitted as standard, but Goliath holders can be supplied at no extra charge.

HOLOPHANE STREET LIGHTING

We have before us a copy of the recently issued Holophane Street Lighting Catalogue, which now appears with a larger size of page. This is well adapted to display the illustrations of typical street lighting units, of which a great variety is listed. In commenting upon this catalogue some time ago we drew attention to one highly novel feature—the Holophane Table of Street Lighting Calculations, which is designed to show how the requirements of the British Standard Specification for Street Lighting may be met. The work involved in preparing this table must have been very considerable, and it should be of substantial help to public lighting engineers.

We understand that Holophane Ltd. have been particularly successful in obtaining street lighting contracts in South America. Amongst the more recent is the contract for Sao Paulo, where about 15,000 units will be used. Other important installations are those in Buenos Ayres, with more than 30,000 units (reputed to be the largest in the world), and Santiago, Chile, where over 11,000 units have been installed. Although South America thus stands out prominently there are numerous other interesting installations throughout Europe, India and Australia which might be mentioned.

SHOP-WINDOW LIGHTING

Through the courtesy of Tungsram Electric Lamps Works (Great Britain) Ltd. we have been favoured with a copy of an ingenious illustrated booklet dealing with shop-window lighting, prepared by Herr Desider Pillitz, of the *Tungsram-Werken*. The booklet contains over 20 black-and-white sketches illustrating principles in window-lighting, many of them of a kind to appeal readily to the man (or woman) in the street. In several cases the contrast between good and bad methods is very strikingly shown. It is to be noted, also, that the author does not forget the needs of those serving in the shop who may suffer from the effects of window lights, even when the latter are screened from the view of persons on the pavement. A telling illustration is that depicting the natural flow of people to the side of the roadway containing the best lighted windows.

ACETYLENE GENERATORS.

A catalogue issued by Messrs. C. S. Milne & Co. Ltd. shows what a serviceable thing the acetylene generator has become. A number of different types are illustrated. One of the main features is the provision made to render generators easily transportable. The larger types are accommodated on a four-wheel trolly, whilst the "baby" design has attached to its base only a couple of wheels, by the aid of which the operator can easily move the apparatus about.

The application of such generators to tunnel-lighting on the Southern Railway was described in our last issue. But such generators have many uses, notably for cutting, welding and lead burning, where simplicity of action and portability are often important considerations.

THE ILLUMINATION OF PERTH (W.A.) TOWN HALL.

On the occasion of the centenary celebrations last year, the Town Hall of Perth, Western Australia, was the only public building illuminated, although other forms of decoration were displayed in great profusion. The illumination was carried out with about 2,000 colour-sprayed Osram lamps supplied by the British General Electric Co., Ltd., and was much admired. No doubt lighting effects will play a more prominent part on similar occasions in the future.

CONTRACTS CLOSED

The following contracts are announced:—

BRITISH THOMSON-HOUSTON CO. LTD.:
Blackburn Corporation Electrical Undertaking; for one year's supply of Mazda gasfilled and vacuum lamps.

SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD.:
The Air Ministry; for a large quantity of Siemens automobile type lamps.

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CONTENTS: History and Development of Methods of Illumination—Gas Lighting—Electric Lighting—Oil, Petrol-Air Gas, and Acetylene Lighting—Illumination and the Eye—Colour and the Eye—Measurement of Light and Illumination—Globes, Shades and Reflectors, and Calculations of Illumination—Problems in Interior Illumination—Outdoor Lighting—Searchlights and other Appliances for the Projection of Light—Index.

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AN INTERESTING INSTALLATION IN THE MIDLANDS.

We have received from the London Electric Firm the accompanying illustration, which shows an interesting installation in a large Corn Exchange in the Midlands. This building is much in request for concerts and similar functions, and the lighting system, equipped with lowering gear, was specially installed owing to difficulties arising from lack of ventilation.

The equipment comprises six 20-light No. 2 Sugg "Swanley" lamps, which were suspended about 15 ft. from the roof and about 40 ft. above the floor. These lamps are operated by Sugg's distance control device (one to each group of three lamps). The lamps being mounted at a considerable height some means of providing access for maintenance was obviously desirable, and accordingly special lowering gear was installed.

The lowering and lifting winches are placed on the side walls of the balconies. In the illustration three lamps are shown in position on the right-hand side, and are lighted up. In order to illustrate the operation of the gear three other lamps on the left-hand side have been lowered.

The gear consists of the familiar connector-suspender type, supplied by the London Electric Firm, which has been in use for a number of years in the city of London and elsewhere. The gear has notable advantages. It is stated that the joint will stand five times the actual pressure of gas (high pressure). The self-sustaining winch, without pawls or gear wheels, is regarded as "fool-proof," and many thousands have been put into operation during recent years.

The large hall in which this lighting equipment was installed is 80 ft. long and 85 ft. wide, and has a seating accommodation of about 1,600. It is stated that by the aid of these gas-lamps all trouble in connection with insufficient ventilation and stagnation of air has been satisfactorily overcome.

An Installation of Lowering Gear in a large Corn Exchange in the Midlands.

G.E.C. INTER-WORKS CRICKET.

The first of the G.E.C. inter-works cricket matches of the season took place on May 17th, when the Magnet House (London) XI visited the G.E.C. Coventry works and scored an eight wickets win.

MAKING CINEMAS SUCCEED.

A novel leaflet in colour, bearing the above title, has been issued by Holophane Ltd. This emphasizes the value of colour lighting and contains some striking pictures showing the altered appearance of decorative surroundings under changing coloured light.

The Illuminating Engineer

The Journal of

GOOD LIGHTING

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SPECIAL INFORMATION.

THE ILLUMINATING ENGINEER (the Journal of GOOD LIGHTING) was founded in January, 1908, and has thus been in existence for twenty-two years.

SINCE the year 1909, when the Illuminating Engineering Society was founded in London, it has been the official organ of the Society.

IT is *the only journal in this country exclusively devoted to Lighting by all Illuminants.*

IT receives the assistance of contributors who are leading experts on illumination in this country and abroad. Foreign Notes and News will be a speciality, and correspondents have been appointed in all the chief cities of the world.

THE Journal contains *first-hand and authoritative information on all aspects of lighting;* it has also been improved and extended by the inclusion of a *Popular and Trade Section* containing special articles of interest to contractors, gas and electric supply companies, Government Departments and members of the Public.

DISCUSSIONS before the Illuminating Engineering Society which are reproduced in this Journal are participated in alike by experts on illumination and *users of light*, whose co-operation is specially invited.

Good Lighting is of interest to everyone. The Journal is read by engineers, architects, medical men, factory inspectors, managers of factories, educational authorities, public lighting authorities, and large users of light of all kinds.

BESIDES being issued to all members of the Illuminating Engineering Society, the Journal has an independent circulation amongst people interested in lighting in all parts of the world. The new and extended form of the Journal should result in a continual and rapid increase in circulation.

Every reader of THE ILLUMINATING ENGINEER, the Journal of GOOD LIGHTING, *is interested in illumination, and is a possible purchaser of lamps and lighting appliances. Gas and Electricity Supply Undertakings likewise benefit by the movement for Better Lighting, with which the Journal is associated, and which stimulates the demand for all illuminants.*

JOIN
The Illuminating Engineering Society.

Monthly meetings are held, at which interesting papers are read, and discussions on such subjects as the lighting of streets, factories, schools, libraries, shops, etc., and exhibits of new lamps and lighting appliances take place.

Members receive *The Illuminating Engineer*, the official organ of the Society, free.

The Society preserves an impartial platform for the discussion of all illuminants, and invites the co-operation both of experts on illumination and users of light; it includes amongst its members manufacturers, representatives of gas and electric supply companies, architects, medical men, factory inspectors, municipal officers, and many others interested in the use of light in the service of mankind.

The Centre for Information on Illumination.

For particulars apply to:

J. STEWART DOW, *Hon. Secretary*,
32, Victoria Street, LONDON, S.W.1.